

November 22, 1864.

Prof. Huxley, F.R.S., V.P., in the Chair.

The Secretary called the attention of the Meeting to some recent additions to the Society's Menagerie :—

1. A young Saiga Antelope (*Saiga tatarica*), received in exchange from the Zoological Gardens, Moscow; believed to be the first instance of the arrival of this scarce animal in this country.

2. Two males and a female of the Maned Goose of Australia (*Bernicla jubata*), forming an interesting addition to the Society's large series of Waterfowl.

3. A young female Chimpanzee (*Troglodytes niger*), which had been placed in the new monkey-house, along with the young Orang (*Simia satyrus*), thus affording opportunities of comparing together the living outlines and habits of these two Anthropoid Apes.

The following papers were read :—

1. NOTICE OF THE ATLAS AND OTHER CERVICAL VERTEBRÆ OF A RIGHT WHALE IN THE MUSEUM OF SYDNEY, NEW SOUTH WALES. BY DR. J. E. GRAY, F.R.S.

Mr. Krefft has most kindly sent to me photographs of some of the bones of Cetacea which are contained in the Museum at Sydney, which is under his direction. They consist of—

1 and 2. Two views of the skeleton of *Euphysetes grayii*, which was described by Mr. William Sharp Macleay, and published in a work which some time ago appeared under the name of Mr. Wall, who I am informed was then employed to prepare skeletons in the Sydney Museum.

3. The atlas vertebra of the Australian Sperm Whale (*Catodon australis* of Macleay), described in the same work. This bone differs rather in shape from the atlas vertebra of the Sperm Whale figured by Cuvier (Oss. Foss. v. t. 24. f. 12), especially in the lower outer angle of the bone not being so acute and produced.

4 and 5. The atlas and other cervical vertebræ, seen in front, and the cervical vertebræ without the atlas, seen obliquely, of a Whale.

These latter bones seem to me to clearly indicate a species of Whale which has not yet been described. On a comparison of these with the figures of the cervical vertebræ of the *Balæna mysticetus* (Cuv. Oss. Foss. v. t. 26. f. 18) and of *Eubalæna australis* (Cuv. Oss. Foss. v. t. 26. f. 13), they appear to be more nearly allied to the genus *Eubalæna* than to *Balæna*, but are very distinct from either.

These bones differ from those of both these genera in the atlas being separate and free from the other cervical vertebræ, instead of being all united together into a single mass. In this respect they agree with the cervical vertebræ of the Sperm Whale (*Catodon*); but they cannot belong to that genus, on account of the general form

Fig. 1.

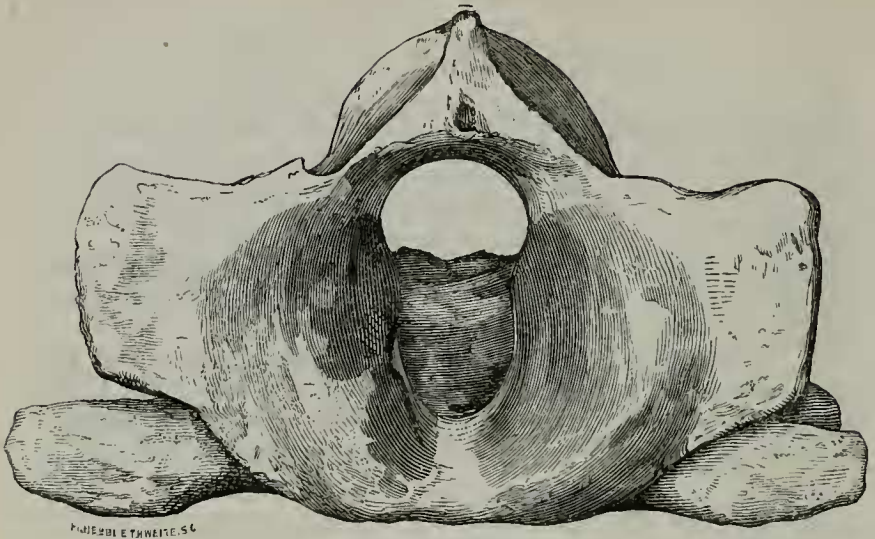
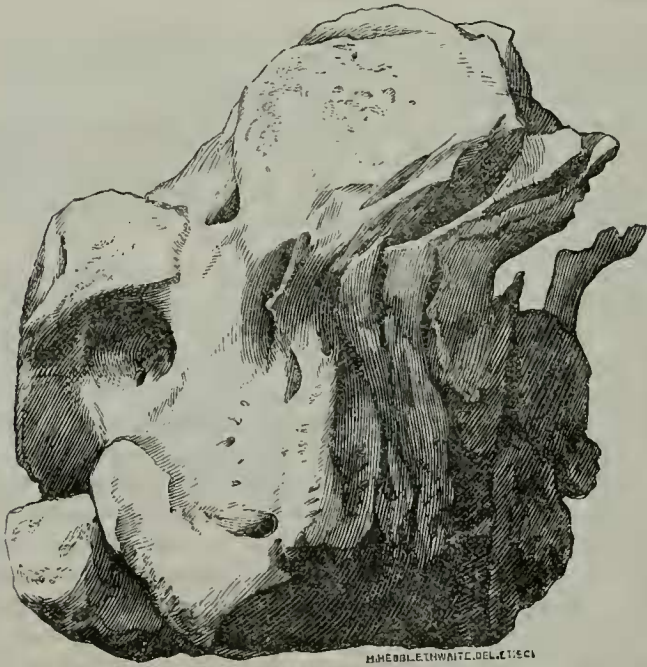


Fig. 2.

*Macleayius australiensis.*

- Fig. 1. Front view of atlas and cervical vertebrae.  
 2. Oblique view of the second to the seventh cervical vertebrae.

of the vertebræ, and especially the form of the neural arch. In both these particulars they much more nearly resemble the genera *Balæna* and *Eubalæna*. Under these circumstances I am induced provisionally to form for these bones a special genus, which I propose to call

**MACLEAYIUS.** It may be thus characterized:—The atlas-vertebræ distinct, separate, with short, broad, truncated lateral processes occupying the upper two-thirds of the side of the body of the vertebra, the lower side of the body forming a section of a circle; the neural arch strong, with a high central ridge forming a distinct keel.

The second, third, fourth, fifth, sixth, and seventh cervical vertebræ united into a single mass by their bodies and neural apophyses; the upper lateral process rudimentary, more or less anchylosed; the lower processes of the second and third cervical vertebræ large, thick, short, truncated; the neural arches very broad and strong, united together, the anterior one forming a large broad, convex, hood-like body over those of the other cervical vertebræ.

I have named this genus after Mr. Macleay, the former Secretary of the Linnean Society, and his son William Sharp Macleay, two naturalists who have done so much for science. To the latter every student of Whales must be indebted for his work on the South-Sea Sperm Whale and the very extraordinary *Euphysetes grayii*.

I have ventured to make these fragments of an animal (as they may be called) into a genus; for I think we can only study the gigantic Whales as we study fossils, from the parts which are preserved to us. It is to be hoped that at some future time more perfect skeletons will be collected and preserved; and then the description of the genus will be filled up.

The form of the atlas at once distinguishes this genus from *Catodon*, or the Sperm Whale. In that genus the atlas is oblong, transverse; the lateral processes occupy the entire side of the body of the bone, and are truncated at the end; the lower edge is gradually curved from the centre to the end of the lateral processes; the upper edge is rather shorter, the middle part over the neural arch being only slightly raised and keeled, and scarcely higher than the upper outer edge of the lateral processes.

The genera of large Whales may be thus arranged, according to the form of the cervical vertebræ:—

- A. *The atlas and other cervical vertebræ united by the body and neural arches into one mass.*

  - a. *The lateral processes of the atlas conical, on the upper part of the sides (see Cuvier, Oss. Foss. v. t. 26. f. 18). Balæna.*
  - b. *The lateral process of the atlas rather broad, rounded, shorter below (see Cuvier, Oss. Foss. v. t. 26. f. 13). Eubalæna.*
  - c. *Lateral processes of the atlas and other cervical vertebræ on lower edge of body. Hyperodon, Lagenocetus.*

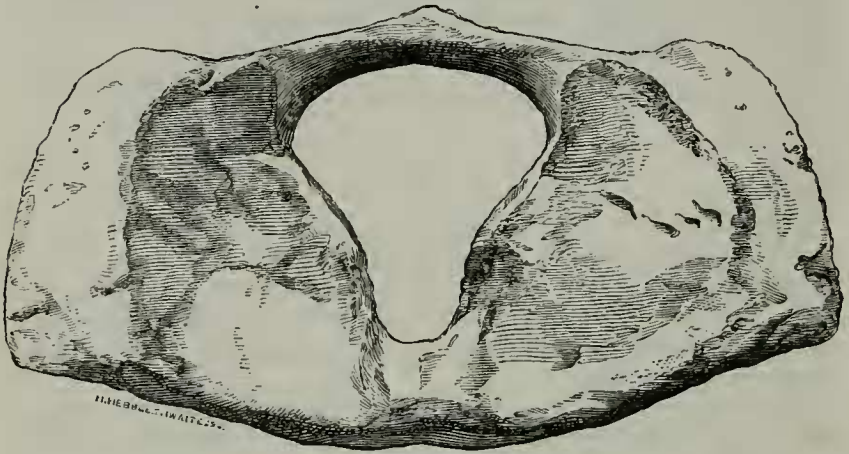
B. *The atlas separate, free; the other cervical vertebræ united into a single mass by the coalescing of the body and neural arches.*

a. *The atlas with a large, high keel over the neural arch.*  
Macleayius.

b. *The atlas with a very slightly elevated keel over the neural arch.* Catodon.

The fact of the atlas being free and separate, as in the Sperm Whales, makes it possible that this genus may be a Toothed Whale allied to the Sperm Whales. But the form of the neural arch, and especially of the lateral processes, induces me to believe that it is most probably a Whalebone Whale allied to *Balæna*, and probably belonging to the family *Balænidæ*.

Fig. 3.



Axis of *Catodon australis*.

In that case the most natural way of arranging the genera which have the cervical vertebræ united into one or two masses will be as follows:—

A. *The neural arch with a strong well-developed ridge on its upper edge, forming a keeled crest.*

a. *The lateral processes of the atlas on the upper part of the side.*  
Balænidæ.

\* *The atlas-vertebra united with the other cervical vertebræ into a single body.* Balæna. Eubalæna.

\*\* *The atlas-vertebra free from, and separate from, the other cervical vertebræ.* Macleayius.

b. *The lateral process of the atlas and other cervical vertebræ on the lower part of the side of the body.* Hyperodon and Lagenocetus.

B. *The neural arch low, scarcely raised, keeled on the upper edge; the lateral processes very wide, occupying nearly the whole side-edge of the body of the vertebra.* Catodontidæ. Catodon.

In *Balæna* the atlas is united to the other cervical vertebræ. The atlas has a nearly circular body, with the lateral process on the upper part of the lateral edge; the process has a straight upper edge and a slanting lower one, gradually shelving down towards the lower part of the side of the body of the vertebra, where it is confluent with the upper part of the base of the large, thick, lower lateral process of the second cervical vertebra.

The upper lateral process of the second vertebra is large and well developed, bent forwards at the end, coherent with the outer end of the upper part of the lateral process of the atlas.

The upper lateral processes of the third and succeeding vertebræ are similar, but smaller, and united at the end to the upper process of the preceding cervical vertebræ. The lower lateral processes are less developed, and they are unfortunately imperfect in the specimen.

The atlas and other cervical vertebræ of the *Lagenocetus latifrons* are all united into a single mass. The body of the vertebræ is nearly circular, with a very large superior conical process formed of the united neural arches; and on the lower part of each side, on a level with the lower edge, are two large, thick, conical processes, formed of the lateral process of the atlas united to the lower lateral processes of some of the other cervical vertebræ.

The upper lateral processes seem to be scarcely developed, as the mass shelves down above towards the lower edge, and has on its upper part a series of perforations on each side, showing the axes of the nerves and vessels between the united vertebræ.

The cervical vertebræ of a *Balæna* in the British Museum, that was dredged up at Lyme Regis, are united together not only by the bodies of the vertebræ, but by the neural arches, which form a large vaulted arch, and by the lateral processes.

The lateral processes of the atlas are large, they arise from the exterior side of the articular cavity, the edge of the upper side being on a level with the top of the concavity, and the blunt end is rather curved up; the underside gradually shelves from the blunt outer end to the lower margin of the articular cavity.

The upper lateral processes of the second, third, fourth, fifth, sixth, and seventh cervicals are all united together at the ends, the process of the second vertebra being the thickest, largest, and bent; it is united to the hinder surface of the end of the lateral process of the atlas by a thick osseous band. The upper lateral processes of the third, fourth, fifth, sixth, and seventh are thinner and smaller, diminishing in size as they proceed backwards; the process of the third is directed backwards to meet the end of the fourth—which, like those of the fifth, sixth, and seventh, is directed rather forwards, towards the head.

The lower lateral process of the second vertebra is very large, thick, confluent with the lower part of the lateral process of the first ver-

tebra or atlas, but produced far beyond it; and it is thickened below and at the end, which is considerably dilated. The lower process of the third vertebra is much smaller, or rather compressed, than that of the preceding one; and the lower processes of the fourth vertebra are similar, but much smaller still, and also shorter. They are confluent together at their base, and with the base of the process of the second vertebra. The other vertebræ are without any lower lateral processes. The neural canal is very large, nearly circular in front, being nearly as high as wide; at the hinder end it is transverse, trigonal, nearly four-fifths as wide as the width of the articulating surface of the first dorsal vertebra, and about two-thirds as high as broad. The outer surface of the united arches is very convex and broad, with a broad triangular disk in front, marked with a central keel; and the upper surface is keeled, with convex sides, behind.

This mass is so unlike the mass of the cervical vertebræ of the Greenland specimen of *Balæna mysticetus* in the College of Surgeons (which, through the kindness of the Council of that Society, I have been able to examine and figure), that I am inclined to think that it may belong to another species, and is probably the cervical vertebra of the Whale which Eschricht has described under the name of *Balæna biscayensis*. They differ in the form of the lateral processes of the atlas and other vertebræ, and in the manner in which they are soldered together, and especially in the external form of the neural arch.

The cervical vertebræ of *Lagenocetus latifrons*, as of *Hyperodon*, are united into a single mass by the union of the bodies of the vertebræ, the neural arches, and the lateral processes.

The united neural arches of the first cervicals are produced, and form a large cone (nearly as high as the height of the body of the vertebra), which shelves down before and behind to the upper part of the neural canal, and on the side to the base of the mass, or the end of the large lateral processes of the second vertebra, the upper part of the sides being marked with the long, deep grooves through which the nerves come out.

The atlas appears to have no distinct lateral processes; or what there are are so united to the very large, high, broad, single lateral process of the second vertebra as not to be distinguished from it, except by the existence of the first groove for the exit of the nerves in the upper part of the body. The lateral process of the second vertebra is massive, conical, and much produced below, on a level with the lower edge of the articular cavity, giving the mass, when viewed in front, an irregular triangular shape.

The third cervical has a broad, short upper lateral process, which is only free from the mass at the end; and this projection is the first appearance of a distinct upper lateral process. The lower process is like, but smaller than, the lower process of the second vertebra, and united to the back part of it, making part of the large inferior lateral prominence.

The fourth and fifth have a similar upper lateral process to the third, but of a much smaller size, the three last being very small—

only small bony plates. These vertebræ have no distinct or marked inferior lateral process.

Fig. 4.

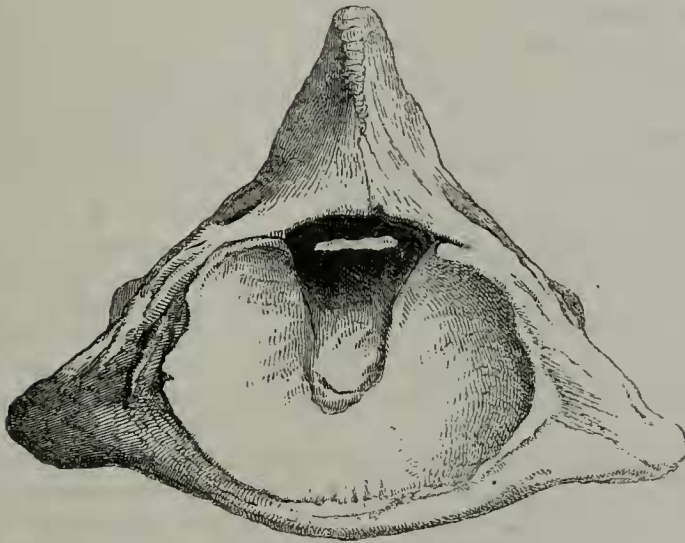


Fig. 5.



Fig. 4. Front view of the cervical vertebræ of *Lagenocetus latifrons*.  
5. Back view of ditto. *a*. The seventh vertebra.

The seventh cervical, though united to the general mass by the body of the vertebra, is yet well defined from the rest of the mass, and retains the usual form of the separate vertebræ of these animals.

The neural arch is of the same form as those of the other cervical vertebræ, but much smaller, and not so high; it is separate from the large conical mass which they constitute, forming a pointed, rather projecting arch at the hinder side of the mass. The upper lateral process is similar in form to the upper lateral processes of the two or three cervical vertebræ that precede it; but it is much larger than these, and bent forwards at the end to unite with the ends of them.

The lower lateral process is very thick and large, forming a large short tuberosity on the lower part of the mass, but quite separate from it. The articulating surface of this vertebra is oblong, erect, rather higher than wide, with a deep suture from the centre to the middle of the upper margin.

The front of the canal of the spinal marrow is triangular, with the angle rounded, the upper side being transverse and the lower ones converging, and about as high as wide. The hinder part of the canal, on the contrary, is trigonal, with the upper sides converging—the lower side being rather wider than the height of the canal, and about two-fifths of the width of the body of the seventh cervical vertebra.

In the British Museum there is the mass of the cervical vertebræ of a young *Hyperodon butzkopf*. It is, unfortunately, not in a good condition, the edge being worn, and the upper lateral processes of the hinder cervical vertebræ being broken off. It agrees in general shape with the cervical vertebræ of *Lagenocetus* above described; but the upper cone formed by the united neural arches is not so high, nor keeled in front. The greatest difference is in the seventh cervical vertebra, its lateral processes and neural arch being as completely united to the other vertebræ as any of the rest, the whole seven forming a single bony mass.

The canal of the spinal marrow is very large, but otherwise like that of *Lagenocetus*; but the hinder part of the canal is higher, being as high as wide above, and its width rather greater than half the width of the body of the seventh cervical vertebra.

## 2. DESCRIPTIONS OF FOUR NEW SPECIES OF AUSTRALIAN LAND SHELLS. BY JAMES C. COX, M.D., F.R.C.S. EDINB.

### 1. HELIX MARIE. = *Lagenocetus*, Cox

*H. testa subample et profunde umbilicata, lenticulari, depressa, crassiuscula, pellucida, parum nitente, obsolete radiato-striata, sub lente utrinque minute granulata, colore variante inter sordide luteum et pallide castaneum, fascia spirali rufescente aut castanea supra carinam, alteraque secus suturam, annuloque lato castaneo circa umbilicum, intus pallidum; spira convexiuscula; anfractibus quinque planulatis, ultimo obtuse carinato; apertura subquadrato-ovata; peristomate expanso, reflexo, albo; margine externo recto, columellari leviter bisinuato, basi expansiusculo.*



Var.  $\beta$ . *Rufo-castanea, sine fasciis.*

Diam. maj. 0·65, min. 0·57, alt. 0·30 unc.

*Hab.* Clarence River, under bark of stumps on stony forest-ridges ; apparently rare (*Macgillivray*).

Animal bluish grey, with darker interstices ; tentacles reddish brown.

## 2. HELIX ASSIMILANS.

*H. testa aperte et perspective umbilicata, depresso-globosa, tenui, nitidissima, pellucida, supra (et intus umbilicum) oblique creberrime costulata et epidermide rufo-flavescente induta, infra lævi, pallide viridi-cornea ; spira angusta, convexa ; anfractibus quatuor et dimidio, convexiusculis, ultimo rotundato, ad os leviter, plano antice vix descendente ; apertura obliqua, fere rotundata ; peristomate simplici, superne et antice recto ; margine columellari subreflexo.*

Diam. maj. 0·75, min. 0·60, alt. 0·40 unc.

*Hab.* Clarence River, under logs in forest-land (*Macgillivray*).

Very closely allied to *H. strangei*, from which, however, it may readily be distinguished by being smaller, less brightly coloured, and much more prominently ribbed, with fewer striæ, also by the absence of the numerous faint decussating lines of the upper surface of its near ally, which, moreover, is confined strictly to the brushes, where *H. assimilans* is never found.

## 3. HELIX WILCOXI.

*H. testa minute umbilicata, globoso-conica, tenuissima, nitida, hyalina, fulvo-cornea, sub lente obsolete radiato-striata ; spira conica, acutiuscula ; anfractibus sex, convexiusculis, ultimo rotundato ceteros altitudine æquante ; apertura paulo obliqua, lunari ; peristomate recto, simplici, tenui ; margine columellari basi breviter expanso, reflexo, umbilicum semitegente.*

Diam. maj. 0·18, min. 0·16, alt. 0·20 unc.

*Hab.* Clarence River, on leaves of trees in the brushes (*Macgillivray*).

Animal (as seen through the shell) yellowish green ; exposed part of body pale bluish white ; upper tentacles and a line behind each dusky bluish.

## 4. HELIX CLARENCENSIS.

*H. testa modice umbilicata, lenticulari, depressa, carinata, tenuissima, pallide succineo-cornea, superne sub epidermide irregulariter radiatim curvato-striata, nitente, inferne convexa, lævissima, nitidissima, vitrea ; spira late conoidea, convexiuscula ; anfractibus quinque et dimidio, planatis, ultimo obtuse carinato ; apertura obliqua ; margine externo angulato, inferiore arcuato, columellari basi breviter expanso umbilicum leviter obtegente.*

Diam. maj. 0·48, min. 0·42, alt. 0·28 unc.

*Hab.* Clarence River, on the ground, also on leaves of plants and trunks of trees in the brushes (*Macgillivray*).

Animal (as seen through the shell) olive-grey, usually with a reddish tinge about the spire, mottled with dull stone-colour and a few black streaky blotches, and about the keel a black marking bordered above with silvery grey; exposed part of body pale greenish white, with silvery markings; upper tentacles, and a line extending backwards from each, black; lower tentacles dusky.

### 3. CONTRIBUTIONS TOWARDS A MONOGRAPH OF THE PANDORIDÆ. BY PHILIP P. CARPENTER, B.A., PH.D.

It is remarkable that, notwithstanding the zeal with which most of the old genera have been divided, to meet the wants of modern malacology, the genus *Pandora*, Lam., has been left untouched by Dr. Gray, Messrs. Adams, and their follower, Chenu. Yet the species known to the elder Sowerby present three distinct types of hinge, which were well figured by him in his 'Conchological Illustrations.' Specimens and even species of *Pandora* (except of the well-known N. Atlantic forms) being very rarely seen in collections, it is presumed that naturalists have had but few opportunities of studying them. Mr. Cuming having most kindly allowed me to examine the hinge of all the species in his collection, it has appeared desirable to propose two new genera, and also to group part of the typical species under a subgenus.

It was at one time thought that the presence of an ossicle in the cartilage was a family mark of *Anatinidæ*, to which *Myadora* from *Pandoridæ*, and *Tellmya* from *Kelliadæ*, were consequently removed. One of the new genera of Pandorids, however, possesses a well-developed ossicle; and a small one is seen even in some species of the normal genus.

The most highly organized structure in the family is found in the North American genus *Clidiophora*, which has both clavicle\* and ossicle; the next is the East-Indian group *Cælodon*, which wants both clavicle and ossicle, but possesses a tent-shaped dentition in the left valve. The simplest form is the well-known *Pandora*, which has neither clavicle, tent, nor ossicle; but in the subgenus *Kennerlia* the ossicle is present. The genus *Myadora* is quite distinct, but connected with *Pandora* through *Kennerlia*.

#### Genus CLIDIOPHORA †.

*Testa Pandoriformis, ventraliter expansa; valva dextra tridentata, dente postico elongato; valva sinistra sæpius bidentata, dente antico simplici; cartilagine ossiculo firmata; sinu pallii nullo.*

1. *Type*, CLIDIOPHORA CLAVICULATA, Cpr. (*Pandora cl.*) P.Z.S. 1855, p. 228.

\* The word "clavicle" is used (in default of a better) to denote a linear dental process running into the body of the shell, often serving as a support to the cardinal plate, as in *Anatina* and some species of *Placunomia*.

† Th. κλειδίον, a clavicle; φέρω.

In the dentition of the right valve this genus resembles *Cœlodon*, except that the posterior lamina is greatly developed, resembling a clavicle. The left valve wants the central tooth and chamber of that genus. This structural deficiency, however, is compensated by the development of an ossicle in the long cartilage. As far as is known, all the species are from North and Central America, and are swollen ventrally.

## 2. CLIDIOPHORA CRISTATA.

*C. t. securiformi, minus transversa, tenui, subplanata; umbonibus ad  $\frac{2}{5}$  longitudinis sitis; ventraliter maxime excurvata; marginibus dorsalibus, post. maxime incurvato, ant. hic et illic alulis triangularibus cristato: intus marginibus posticis utraque in valva erectis: v. dextr. dente postico satis longo, cicatrice adductoris tenuis haud porrecto; dente centrali extante; dente antico a margine separato, usque ad cic. anticam porrecto, haud extante: v. sinistr. dente post. bifido, haud extante, alterum recipiente, fossa cartilaginea contigua; d. centr. nullo; d. ant. satis extante, usque ad cicatr. anticam porrecto; linea pallidri a margine valde remota, regulariter in puncta divisa; radiis ab umbonibus usque ad puncta conspicuis, æqualibus; ossiculo tenui, elongato.*

Long. 1.0, lat. .6, alt. .1 poll.

*Hab.* in sinu Californiensi; legit Conway Shipley diligentissimus; sp. un. in Museo Cumingiano.

This species is known from *C. claviculata* by the much greater posterior curvature of the beaks, and anteriorly by the beautiful triangular wing-like serrations of the margin, in which it resembles *Tellidora burneti*. The inside has elegant rays from the umbo to the dotted pallial line.

## 3. CLIDIOPHORA TABACEA, Mensch. (Mus. Gron.).

Specimens under this specific name are preserved in the Cumingian collection.

3 a. CLIDIOPHORA TRILINEATA, Say (*Pandora tr.*), Hanl. Rec. Shells, p. 49.

3 b. CLIDIOPHORA NASUTA, Sby. (*Pandora n.*), Sp. Concl. f. 18, 19.

It is probable that these are simply varietal forms of the well-known New England species. Say's name and Sowerby's excellent figure prove that the peculiar hinge of the genus was observed by both authors. Mr. Cuming gives "Philippines" as the habitat of his specimens of *C. nasuta*, probably in error. Mr. Hanley quotes it as a synonym of *C. trilineata*. An examination of a large series from Staten Island proves that the outline varies considerably. The tablet in the Nuttallian collection at the British Museum, marked *Pandora punctata*, belongs to this species. Young shells, when quite perfect,

display faint radiating grooves on the prismatic layer of the flat valve, as in *Kennerlia*.

#### 4. CLIDIOPHORA PUNCTATA, Conr.

This very rare species was only known in England by worn left valves in the British Museum, and in Mr. Cuming's and Mr. Hanley's collections. The first perfect specimens were dredged by Dr. J. G. Cooper (Zoologist to the Californian State Survey) at San Pedro. A young shell, sent by him to the Smithsonian Institution, displays a dentition agreeing in the main with *C. trilineata*. In the flat valve, the central and anterior teeth are close together and nearly parallel; the anterior short, nearly obsolete; the middle long and sharp, corresponding with the long, sharp tooth in the convex valve, which points to the outside of the anterior scar, instead of to the middle, as in *C. trilineata*. The (posterior) clavicle-tooth in the flat valve is longer than in the Eastern species, with the cartilage on it for two-fifths of the length. In *C. trilineata* it lies by the side, nearly the whole way. The posterior margin of the convex valve fits between the clavicle and the margin of the flat valve. The ossicle is remarkably long and thin. The punctures are extremely conspicuous even in this young, transparent, and papyraceous specimen; and, what is more peculiar, the dried remains of the animal are covered with minute pearl-shaped grains of shelly matter corresponding with them.

4 a. CLIDIOPHORA DEPRESSA, Sby., = *Pandora d.*, Sp. Conch. f. 11, 12; Hanl. Rec. Shells, p. 49.

The "posterior" dilated side of Sowerby is the "anterior" of Hanley. The species was constituted from a "very few specimens, all of them much worn down, as if they had been used as ornaments." The hinge therefore may not have been accurately observed. They were part of the Humphrey collection, and perhaps from the Californian region. Judging from the shape (for no type has been discovered), it may be identical with *C. punctata*, Conr.

#### 5. CLIDIOPHORA ACUTEDENTATA (vice C. B. Ad.).

*C. t. parum* "elongata, ovata; parte postica" haud rostrata, latiore, obtusa; "margine dorsali" postico "subrecto; margine ventrali rotundato," haud tumente; parte antica curtioire; "umbonibus subæqualiter subconvexis, umbone dextro postice angulato": intus, v. convexa dente antico magno, acutissimo, medio parvo, postico valido, maxime elongato; v. planata dentibus antico et postico acutis; ligamento juxta dentem posticum sito.

"Long. .7, lat. .42, alt. .11 poll."

*Hab.* in Panama: sp. unicum, postice fractum, legit C. B. Adams deploratus: Museu Coll. Amherstianæ: = *Pandora cornuta* (Gld.), C. B. Ad. Pan. Shells, no. 498, P.Z.S. 1863, p. 368.

Prof. Adams's "appropriate name suggested by Dr. Gould" being calculated to mislead, I have thought it necessary to change it.

Most of the original diagnosis must also be dropped, the parts above quoted being all that it is desirable to retain. The present description is written from notes and drawings made on a careful examination of the broken type. The lines of growth show that, so far from being "cornute," the species is remarkable for the absence of beak,—the margins being more equally rounded even than in *P. obtusa*, which in shape it somewhat resembles. The hinge is almost exactly like that of *C. claviculata*, jun., but differs in the somewhat greater proportionate length of the clavicle, and in the unwonted size and sharp pointing of the anterior tooth. The new name has been chosen to record this peculiarity, rather than follow the modern custom of naming from the author of the mistake. The best naturalists occasionally err; but corrections can be made without affixing a false compliment in perpetuity.

6. ? CLIDIOPHORA DISCORS, Sby. (*Pandora d.*), P. Z. S. 1835, p. 99; Sp. Conch. f. 29, 30.

The type has not been discovered; the figure and diagnosis only relate to the outside; and the habitat is not stated. The genus is therefore doubtful; but in shape it resembles the young of *C. claviculata*.

7. ? CLIDIOPHORA ARCUATA, Sby. (*Pandora a.*), Sp. Conch. f. 27, 28; P. Z. S. 1835, p. 93; Hanl. Rec. Shells, p. 49.

The worn valves in the Cuminging collection do not allow of a confident determination of the genus.

#### Genus CÆLONDON\*.

*Testa Pandoriformis: valva sinistra dentibus duobus, cicatricem adductoris anticam versus radiantibus, lamina infra cavernosa junctis: ossiculo nullo: sinu pallii nullo.*

The shells of this group vary considerably in shape and dentition in the different species; but agree in this, that in the left valve there is a kind of tent, formed by a thin laminated roof lying on the top of two diverging teeth. It is hard even to guess what is the use of this (perhaps unique) structure; especially as its opening is not towards the body of the shell, but directly facing the anterior adductor. It is seen at once on opening the typical species, which was well figured by Sowerby, Sp. Conch. f. 22. In the aberrant forms it might easily be overlooked, and a glass is needed to detect it in small specimens; but if it exists, the shell can be supported on a pin thrust into the "hollow tooth." When more species are known, the group may require subdivision, the *C. flexuosus* especially presenting a marked transition to *Clidiophora*. In that genus the posterior part excels in development; in *Cæledon*, the anterior. All the known species are from the Eastern seas, but are very seldom seen in collections. An enlarged diagnosis of the type species is offered.

\* Th. κοῖλος, hollow; ὀδόν, tooth.

## 1. CÆLODON CEYLANICUS.

*Pandora ceylanica*, Sby. P. Z. S. 1835, p. 94; Sp. Conch. f. 20, 21, 22, = *P. ceylonica*, Hanl. Rec. Shells, p. 50, = *P. indica*, Chenu, Man. Conch. ii. p. 54. f. 214.

*C. t. planata, rostrata, securiformi; ventraliter maxime, antice satis excurvata; margine postico dorsali valde incurvato: intus, valva dextra, margine postico rectangulatim superstante, dentibus anticis ii. prælongis, satis extantibus, usque ad cicatricem adductoris continuis, dentem cavernosum valvæ alterius amplectantibus; dente postico curtiore, extante, fossam cartilagineam per totam longitudinem gerente: valva sinistra, margine postico subrectangulatim superstante; sulco postico dentem v. alt. recipiente; dentibus anticis usque ad cicatricem adductoris continuis, centrali longiore, plus quam dimidio interstitii lamina tenui tecto, ventraliter arcuato.*

Under this species, of which the correct locality appears in the name, Mr. Sowerby quotes "a single specimen obtained at Island Muerte, W. Columbia, 11 fm., by Mr. Cuming." The hinge may not have been examined. The shell quoted does not now appear in the Cumingian collection, and probably belonged to *Clidiophora claviculata*, which in shape resembles the typical *Cæloдон*.

1a. CÆLODON CUMINGII, Hanl. (*Pandora c.*), P. Z. S. 1861, p. 272.

This agrees with the last species in shape and dentition, and is probably only a variety.

*Hab.* Philippines (*Cuming*).

2. CÆLODON DELICATULUS, A. Ad. (*Pandora d.*) P. Z. S. (diagn. auct.).

*... marginibus dorsalibus ad angulum circ. 160° divergentibus: cardine v. dextr. dente postico satis elongato; centrali curto, ad umbonem valde calloso; antico longissimo, cicatricem ant. superante, margini contiguo: v. sinistr. dente centrali curto, supra cavernam erecto, in anticum prælongum continuo.*

In this species, the shape of which is not unlike *P. obtusa*, though less transverse, the anterior teeth are enormously developed at the expense of the central. These are short, but prominent; in the left valve bent over, along the whole length, to form the roof of the chamber, and then drawn on into the anterior tooth.

## 3. CÆLODON ELONGATUS, n. s.

*C. t. parva, tenuissima, maxime planata; parte antica minore, excurvata; ventraliter valde excurvata, postice maxime elongata, rostro angustiore; dorsaliter valde incurvata: intus, v. dextr. dente post. satis longo; d. centrali prælongo, postice flecto, cicatricem adductoris parum superante; d. antico minore: v. sinistr. cartilagine valde elongata, postice sita; d.*

*centrali prælongo, postice flecto; d. antico minore a margine remoto, lamina totius longitudinis ad centralem juncto.*

Long. .65, lat. .3, alt. .05 poll.

*Hab.* in China et Borneo (*Mus. Cuming.*).

This species is the Eastern representative of *P. rostrata*, as is *C. delicatulus* of *P. obtusa*. It has the reverse dentition, the central tooth being very long, and the anterior short, bridged over to meet it at the whole length. In the Borneo shell, which is larger, the anterior tooth is rather longer, with the front margin of the ceiling more incurved; but the differences are probably due to increased age only.

4. **CÆLODON FLEXUOSUS**, Sby. (*Pandora f.*), Sp. Conch. f. 13, 14, 15; Hanl. Rec. Shells, p. 49 (diagn. auct.).

*... cardine v. dextra dente postico prælongo, a margine separato, usque ad cicatr. adduct. porrecto; fossa cartilaginea curta, inter dentes post. et centr. sita; d. centr. curtissimo, maxime extante, retrorsum deflecto; d. ant. minimo, pene obsoleto: v. sinistr. sulco prælongo postico; fossa cartilaginea separata, curtioire; d. centr. extante, curtissimo, supra cavernam pyriformem, in dentem anticum usque ad cicatr. adduct. prolongatum, porrecto.*

This long-known but rare Red Sea species is to *Pandora* what *Trisis* (Gray) is to *Arca*. It is swollen and twisted, and, by its long clavicle, forms an interesting transition to *Clidiophora*.

4 a. ? **CÆLODON UNGUICULUS**, Sby. (*Pandora u.*), Sp. Conch. f. 16, 17; Hanl. Rec. Shells, p. 49.

The type has not been found of this species, which was described from a convex valve only. It clearly belongs to the same section as *C. flexuosus*, and, though the shape is somewhat different, perhaps it is only a variety.

#### Genus PANDORA, Lam.

It is proposed to limit this genus according to the diagnosis of Sowerby, founded on Lamarck's. Succeeding naturalists have adopted the diagnosis, while they have included in it species to which it did not apply\*. It presents a very simple type of hinge, as though the Pandorid idea were gradually fading away towards *Myodora*. The *P. wardiana* is the finest species in the group; but it is scarcely typical, having the radiating grooves of the section *Kennerlia*. The Lamarckian type is the *Tellina inæqualis* of Linnæus.

1. **PANDORA ROSTRATA**, Lam., Forbes & Hanl. et auct. plur. = *P. inæqualis*, Linn., Gray, Add.

\* Chenu, however (Man. Conch. ii. p. 51), gives an original and extended diagnosis, in which he accredits to the whole genus "une dent triangulaire, aplatie, bifurquée, dont la portion antérieure, plus longue, se prolonge jusqu'à l'impression musculaire antérieure"—a character which only belongs to the section *Cælodon*.

2. PANDORA OBTUSA, Lam., auct.  
 3. PANDORA BREVIFRONS, Sby., Sp. Conch. f. 25, 26; P. Z. S. 1835, p. 93.

4. PANDORA CISTULA, Gld. Otia, p. 77.

This species is not quoted in the index to the E. E. Moll., but appears in the text (p. 396) and in the Atlas (f. 500). In shape, but not in texture, it resembles *P. oblonga*.

5. PANDORA OBLONGA, Sby., Sp. Conch. f. 10; Hanl. Rec. Shells, p. 49.

The unique type of this species, from Humphrey's collection, has not been found; it was not described in the P. Z. S., and very closely resembles *P. rostrata*.

6. PANDORA RADIATA, Sby., P. Z. S. 1835, p. 24; Sp. Conch. f. 23, 24.

7. PANDORA WARDIANA, A. Ad. P. Z. S. 1859, p. 487.

No ossicle has been observed in any of the above species. If it be found hereafter in living specimens of the grooved *P. radiata* and *P. wardiana*, they should be removed to the subgenus. The group is not local, as appears to be the case with *Coclodon* and *Clidiophora*, being found in both hemispheres and on both sides of the equator.

#### Subgenus KENNERLIA\*.

*Pandora cartilagine ossiculo tenuiore instructa; lamina exteriore prismatica valvæ planatæ radiis plerumque insculpta.*

The typical species have radiating grooves in the exterior prismatic layer of the right valve. These have not been observed in *K. glacialis*, but perhaps the specimens are somewhat decorticated. The essential character is the possession of an ossicle. This is well developed in *K. glacialis*, but so thin in the other species that it is often hidden in dried shells by the contraction of the cartilage. The first species in which it was observed (Dr. Kennerley having sent several fresh specimens, preserved in alcohol, to the Smithsonian Institution) was

1. KENNERLIA FILOSA, n. s.

*K. t. tenui, planoconvexa, maxime rostrata; marginibus dorsalibus rectis, ad angulum circ. 160°; ventrali regulariter et modice excurvato, postice vix sinuato; epidermide olivacea, plerumque erosa, postice corrugata; lamina externa prismatica spongiosa; valva planata radiatim sulcata (quasi filosa), sulcis distantibus; valva convexa, costa obtusissima postice decurrente;*

\* Named in grateful remembrance of the services rendered to science by the late Dr. Kennerley, the naturalist to the American N. Pacific Boundary Survey; whose premature death has interrupted, almost at the onset, our knowledge of the dredging-fauna of Puget Sound.



*lineis seu undis incrementi conspicuis : intus dente cardinali uno, parvo, extante ; callositate claviculoidea antica, margini contigua ; fossa cartilaginea postice sita ; cicatricibus adductorum rotundutis, margini dorsali contiguis ; linea pallii simplicis.*

Long. .8, lat. .4, alt. .12 poll.

*Hab.* in sinu Pugetiano (*Kennerley*).

## 2. KENNERLIA BICARINATA, n. s.

*K. t.* “*K. filosa*” *simili, sed haud rostrata ; postice latiore ; carinis in valva convexa duabus, in valvu planata una, ex umbo-nibus postice decurrentibus ; lamina prismatica radiatim sulcata, haud spongiosa ; valva convexa tenuiter indentata ; ligamento elongato, tenuissimo.*

Long. .5, lat. .25, alt. .06 poll.

*Hab.* in insula Catalina, Californiae ; 40–60 uln., rara (*Dr. J. G. Cooper*. State Geological Survey Coll. no. 1063 ; Mus. Smithsonian Inst.).

The shape and keels at once distinguish this beautiful little species from its Northern ally, with which, in the hinge and threading of the outer layer, it exactly agrees. The ligament in both species is extremely thin, holding the valves together from the umbo to the posterior end. The fossil *Pandora bilirata*, Conr., may prove identical with this recent species ; but the diagnosis, figure, and type specimen are so imperfect that it would be too hazardous to affiliate them.

## 3. KENNERLIA GLACIALIS, Leach (*Pandora gl.*), Sby. Sp. Conch. f. 4, 5, 6 ; Hanl. Rec. Shells, p. 49 (diagn. auct.).

*. . . valva dextra callo conspicuo fossam cartilagineam firmante ; ossiculo fortiore.*

The known species of *Kennerlia* are thus confined to the North Pacific and the Arctic seas. The diagnosis of No. 1 belongs to a paper on Dr. Kennerley's new species in the Journ. Ac. N. S. Philad. ; and that of No. 2 to a series of papers on Dr. Cooper's new species in the Proc. Calif. Ac. N. S. They are inserted here to complete the monograph, as far as known to the writer. The “*Pandora striata*, Quoy” (Add. Gen. ii. p. 371), is a *Myodora*. The latter genus is so well defined that no alteration is proposed in it.

## 4. DESCRIPTIONS OF SEVEN NEW SPECIES OF LAND SHELLS, FROM THE COLLECTION OF H. CUMING, ESQ. BY DR. L. PFEIFFER.

1. *HELIX PEASEANA*, Pfr. (172 c). *T. perforata, turbinata, solidula, irregulariter striata, et striolis antrorsum descendentibus confertissimis sculpta, vix nitidula, fusculo-carnea, maculis et punctis corneis irregulariter notata et fascia unica supra-*

*peripherica obsoleta ornata; spira regulariter conoidea, apice obtusula; anfr. fere 6, vix convexiusculi, sensim accrescentes, ultimus subangulatus, non descendens, subtus convexior; apertura fere diagonalis, subungulato-lunaris, intus submargaritacea; perist. simplex, rectum, marginibus vix conniventibus, columellari juxta perforationem breviter fornicato-reflexo.*

Diam. maj. 37, min. 32, alt. 23 mill.

*Hab.* in insula Timor.

2. *HELIX ZONELLA*, Pfr. (1106 a). *T. subanguste umbilicata, depressa, solidula, conferte ruguloso-striata, pallide fuscula, zona mediana albida (sæpe rufo marginata) cincta; spira convexa, parum elata; anfr. 5½, convexiusculi, ultimus rotundatus, antice vix descendens; apertura obliqua, lunato-rotundata, intus margaritacea; perist. simplex, marginibus convergentibus, supero recto, basali breviter reflexo, ad insertionem dilatato.*

Diam. maj. 15, min. 13, alt. 8 mill.

*Hab.* in White Mountains, 6500', insulæ Cretæ (Capt. Spratt).

3. *CLAUSILIA GLABELLA*, Pfr. (82 a). *T. arcuato-rimata, fusiformis, gracilis, interdum ventrosior, solida, sublævigata, irregulariter striatula, nitidula, alba, locis detritis cornea; spira elongata, apice luteo-cornea, acuta; anfr. 13-14, vix convexiusculi, ultimus subsolutus, antice rugoso-costatus, basi obtuse bicristatus; apertura parum obliqua, piriformis, intus carnea; lamella supera minuta, infera subverticaliter ascendens; lunella et plica columellaris inconspicuæ; plica palatalis 1, supera, mediocris; perist. continuum, subæqualiter expansum et reflexiusculum.*

Long. (formæ typicæ) 20, diam. 4 mill.

*Hab.* in White Mountains, 5000', insulæ Cretæ (Spratt).

4. *CLAUSILIA EXTENSA*, Pfr. (94 a). *T. subarcuato-rimata, fusiformi-subulata, solida, cretacea, opaca, costulis subrectis confertis munita; spira perelongata, apice acutiuscula, nigra; sutura levissima, costulis subcrenulata; anfr. 15-16, apicales convexi, reliqui planiusculi, ultimus breviter solutus, antice costis validioribus, distantioribus, hinc inde confluentibus, basi crista brevi munitus; apertura parum obliqua, oblonga; lamellæ tenues, approximatae; lunella et plica subcolumellaris inconspicuæ; plica palatalis unica; perist. continuum, album, undique expansum et reflexiusculum.*

Long. 28, diam. 4½ mill.

*Hab.* in Sitra insulæ Cretæ (Spratt).

5. *CLAUSILIA TENUICOSTATA*, Pfr. (100 b). *T. arcuato-rimata, fusiformis, solidula, costis tenuibus subarcuatis sculpta, cretacea; spira a medio attenuata, apice cornea, acutiuscula; anfr. 11-12, subplani, ultimus vix solutus, antice validius costatus, basi subbicristatus; apertura vix obliqua, piriformi-oblonga, intus fuscula; lamella supera filaris, infera fortior,*

... HISTORY

... HISTORY



J. Jeanens. lith

M. & N. Hanhart. imp.

GRANATELLUS PENZANCEI



F 7 3.1364 P. 1111/1111

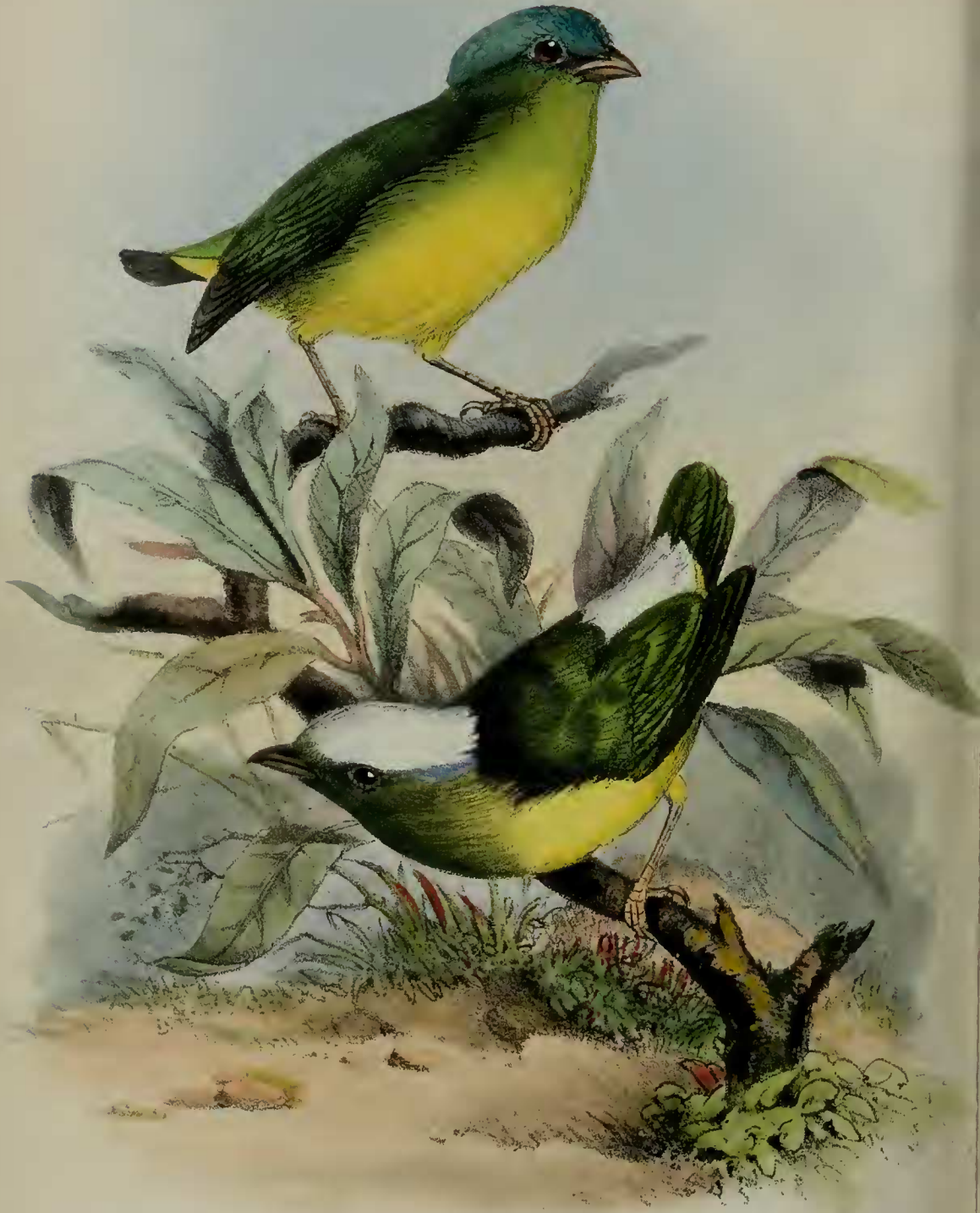


John James

J. James

J. James





J. Jennens lith.

M. & N. Harber. del.

PIPRA NATTERERI



*oblique ascendens; lunella et plica subcolumellaris inconspicua; plica palatalis 1, profunda; perist. continuum, tenue, undique breviter expansum.*

Long. 15, diam.  $3\frac{2}{3}$  mill.

*Hab.* in Mirabello et Selino insulæ Cretæ, necnon in insula Gardos prope Cretam (*Spratt*).

6. *CLAUSILIA RUDIS*, Pfr. (108 a). *T. arcuato-rimata, ventroso-fusiformis, solida, costulis subconfertis lamellaribus munita, opaca, sordide albida; spira infra medium turgida, sursum valde attenuata, apice acutiuscula; anfr. 11, convexi, ultimus vix solutus, costis validis, distantibus, irregularibus sculptus; apertura vix obliqua, piriformi-ovalis; lamellæ subæquales, convergentes; lunella et plica subcolumellaris inconspicua; plica palatalis 1, supera, mediocris; perist. continuum, album, sublate expansum.*

Long. 17, diam. max. fere 5 mill.

*Hab.* Zakro in parte orientali insulæ Cretæ (*Spratt*).

7. *CLAUSILIA DISTANS*, Pfr. (113 a). *T. rimata, elongato-fusiformis, solidula, costis lamellaribus subdistantibus sculpta, in interstitiis sub lente confertissime striata, cretacea; spira perelongata, gracilis, apice acuta, cornea; anfr. 13-15, vix convexiusculi, ultimus breviter solutus, costis validioribus basi in cristam indistinctam confluentibus munitus; apertura vix obliqua, oblonga, intus alba; lamellæ approximate; lunella et plica subcolumellaris inconspicua; plicæ palatales 2, supera longa, infera brevis, profunda; perist. album, latiuscule expansum.*

Long. 20-24, diam.  $3\frac{3}{4}$ -4 mill.

*Hab.* Sudsuro in parte meridionali insulæ Cretæ (*Spratt*).

5. DESCRIPTIONS OF SEVEN NEW SPECIES OF BIRDS DISCOVERED BY THE LATE DR. JOHN NATTERER IN BRAZIL. BY P. L. SCLATER, M.A., PH.D., F.R.S., SECRETARY TO THE SOCIETY.

(Plates XXXVII., XXXVIII., XXXIX.)

During a recent visit to Vienna I had the pleasure of spending a few days in examining the collections of birds and other animals belonging to the Imperial Zoological Cabinet in that city, wherein I may state that I received the utmost facilities from Dr. Redtenbacher (the Director), Herr August von Pelzeln (who has charge of the collection of birds), and the other authorities of that establishment.

The Director of the Imperial Cabinet, moreover, was so obliging as to allow me to acquire in exchange a certain number of duplicate bird-skins from the Imperial Collection, belonging principally to spe-

cies collected by the late Dr. Johann Natterer during his lengthened sojourn in various parts of the Brazilian empire. Since my return to this country I have carefully compared these with the tolerably full series of skins of American birds in my own collection. The result has been that I have found amongst them several new and very interesting species, which I now propose to describe under the names attached to them (where such have been given) by the late Dr. Johann Natterer in his catalogue.

In order to make my notices of these undescribed species more complete, Herr v. Pelzeln has kindly supplied me with extracts from Natterer's MS. Journal, giving the particulars concerning each specimen, noted at the time it was obtained, as to locality, habits, and the coloration of the soft parts.

1. GRANATELLUS PELZELNI, sp. nov. (Pl. XXXVII. fig. 1.)

"*Tanagra*, sp. no. 793," Natt. MS.

*Supra plumbeus, pileo et capitis lateribus nigris: vitta post-oculari utrinque lata et corpore subtus albis: pectore toto, ventre medio et crisso rosaceo-rubris: alis et cauda nigricantifuscis, immaculatis: rostro plumbeo, tomis pallescentibus: pedibus corylinis.*

Long. tota 4·5 poll., alæ 2·0, caudæ 2·0.

*Hab.* in ripis fl. Madeira in imp. Brasil.

*Mus.* Vindob. et P. L. S.

This pretty little bird makes a third species of the genus *Granatellus* (Bp. *Consp.* p. 312), which thus has its area extended into South America—the only two previously known species being from Mexico. It has the same general coloration as the two older species, but may easily be distinguished from *G. venustus* (which it most nearly resembles) by the want of the narrow black breast-band and the outer rectrices not being tipped with white, and from *G. sallæi* by its white throat.

Examples of this *Granatellus* were obtained by the late Johann Natterer at Destaramento do Ribeirão, on the river Madeira, in Sept. 1829.

The following extracts are from Natterer's notes on this bird, which bears the no. 793 in his Catalogue.

"Destaramento do Ribeirão, am Flusse Madeira, 17 Sept. 1829, im Walde; Einzeln: Iris dunkelbraun, Rücken und Spitze des Oberschnabels schwarz, der übrige Theil und der Unterschnabel so wie die Füße schön blaugrau, Zehen dunkelgrau. Die Nasenlöcher sind frei, unbedeckt und rund."

"Destaramento do Ribeirão, 19 Sept. 1829, aus dem nahen Wald, auf niederen Bäumen; es war ein Paar. Weibchen in der Mause. Iris dunkelbraun, Schnabel und Füße wie am Männchen."

As Natterer has left this species unnamed, I propose to call it after my friend Herr August von Pelzeln, Assistant in the Imperial Zoological Collection of Vienna, who has done so much towards unveiling to naturalists the long-hidden treasures of that remarkable collection.

The males of the three known species of *Granatellus* may be diagnosed as follows:—

(1.) GRANATELLUS VENUSTUS, DuBus, MS.; Bp. Consp. p. 312: *gula alba; rectricum externarum apicibus albis.* Ex Mexico.

(2.) GRANATELLUS PELZELNI, mihi: *gula alba; pileo nigro; rectricibus concoloribus.* Ex Amazonia.

(3.) GRANATELLUS SALLÆI, Sclater, P. Z. S. 1856, p. 292, pl. 120, et 1859, p. 374: *gula ardesiaca; pileo dorso concolore; rectricibus concoloribus.* Ex Mexico merid.

The figure of *G. venustus* (Pl. XXXVII. fig. 2) is an exact copy of the figure of this species given by the Vicomte DuBus in the unpublished plate (pl. 34) of his 'Esquisses Ornithologiques,' a copy of which (as I have already mentioned in these Proceedings\*) has been obligingly sent to me by the author.

I have never yet met with an example of this species, as I believe that the imperfect specimen in the British Museum spoken of by me (P. Z. S. 1859, p. 375) belongs probably to *G. pelzelni*.

## 2. TANAGRA OLIVINA, Natt. MS., no. 657.

*Cinerascenti-olivacea, alis caudaque fuscis, dorsi colore marginatis, subtus dilutior; loris, oculorum ambitu, gutture et abdomine medio flavido indutis: rostro plumbeo, ad basin pallidior: pedibus fuscis. Sexus similes.*

Long. tota 6·5, alæ 3·2, caudæ 3·0.

*Hab.* in prov. Brasiliana Cuyaba.

*Mus.* Vindob. et P. L. S.

*Obs.* Affinis *T. striatæ* quoad formam, et hujus specimini juniore coloribus haud dissimilis, attamen sane diversa, et species optima, sexuum simili pictura, et colore gulæ et abdominis flavescente distinguenda.

Herr von Pelzeln furnishes the following extract concerning this new and interesting species of true *Tanagra*, which was obtained by Natterer, in 1824, in Cuyaba, and named by him *Tanagra olivina*.

"Cúyaba 1 Juli 1824, Männchen, scheint alt, nicht in der Mause. Iris dunkelbraun; Schnabel ziemlich gewölbt, bläulich aschgrau, die Spitze bis gegen die Hälfte schwarzgrau. Nasenloch linienförmig, horizontal, an beiden Enden aufwärts gebogen, mit häutigem Deckel. Füße graulichschwarz."

## 3. SPERMOPHILA PILEATA.

*Pyrrhula pileata*, Natt. MS., no. 666.

*Lacteo-alba, subtus pura, supra cineraceo adumbrata; pileo, alis et cauda nigris: speculo alari albo: secundariorum externorum marginibus angustis dorso concoloribus: rostro nigro: pedibus obscure carneis.*

\* P. Z. S. 1859, p. 375.

Long. tota 4·2, alæ 2·5, caudæ 1·75.

*Hab.* Borda do Matto, in imp. Brasil.

*Mus.* Vindob. et P. L. S.

*Obs.* Affinis *S. aurantiæ*, sed corporis colore sane diversa.

Dr. Natterer met with this distinct species of *Spermophila* at Borda do Matto, in November 1822. He remarks in his MS. that it is like his no. 282 (*S. aurantia*) in form, but decidedly different, although he at first confounded them together. He met with the first examples near San Paolo, upon the water-plants of the morass of the Tamandataky.

Natterer obtained specimens of at least eight species of this group of Finches, namely,

1. *S. cinerea*, Lafr. et d'Orb., no. 465, Natt. MS., Yteorare.
2. *S. mysia* (Vieill.), no. 763.
3. *S. castaneiventris*, Cab., no. 883, Borba.
4. *S. minuta* (Linn.), no. 469, Curytiba.
5. *S. cinnamomea*, Lafr., no. 1206, Enganho di Gama & Matogrosso.
6. *S. pileata*, no. 666, Borda do Matto.
7. *S. aurantia* (Gm.), no. 282, Thaubaté.
8. *S. nigro-rufa* (Lafr. et d'Orb.), no. 759, Pornte.

#### 4. POOSPIZA OXYRHYNCHA.

*Emberiza oxyrhyncha*, Natt. MS., no. 457.

*Supra pallide fusca, capite cinerascentiore, superciliis angustis pallide fulvis; interscapulio nigricante brunneo striato; alis caudaque fuscis, marginibus externis pallidioribus: subtus pallide ochracea, pectore summo in cinnamomeum trahente: rostro nigro; pedibus carneis.*

Long. tota 5·3, alæ 2·5, caudæ 2·6.

*Hab.* in prov. Brasiliana Curytiba.

*Mus.* Vindob. et P. L. S.

This is a typical *Poospiza*, allied to *P. thoracica*, *P. nigro-rufa*, *P. cinerea*\*, but distinct in colouring from any species with which I am acquainted. The tail is much rounded, the outer rectrices being 0·8 in. shorter than the medial. The tail-feathers are much worn at the points in my specimē. Dr. Natterer's MS. Journal contains the following particulars relative to the species, which bears his number 457:—

“Curytiba,  $\frac{3}{4}$  October 1820, in Campo, in niederem Gesträuche, altes Männchen. Iris dunkelbraun, Schnabel schwarz, Füße dunkelbraungrau, die Tarsen mit Röthlich überzogen.” . . . “Altes Männchen, Curytiba, 28 Nov. 1820, halt sich am Rande der Wälder auch an Morästen auf niederem Gebüsch auf, setzt sich auch auf etwas höhere Bäume; singt laut, nicht angenehm. Iris dunkelbraun, Schnabel schwarz. Nasenlöcher länglich, aber mit einem häutigen Deckel. Zunge knorpelig, an der Spitze zweitheilig, Füße dunkelgraubraun.”

\* Bp. Cosp. p. 472.

5. *HYPOCNEMIS FLAVESCENS*, sp. nov.

*Formicivora flavescens*, Natt., no. 857.

*Supra cinerea, capite nigro, loris, superciliis et stria mediali albis; cervicis lateribus et interscapulio albo nigroque variegatis: macula interscapulari celata, alba: subtus alba, pectore sulphureo, hypochondriis et ventre imo cum crisso rubiginoso-rufis: alarum tectricibus nigricantibus, omnibus macula apicali fulvescenti-alba ornatis: remigibus et rectricibus fuscis, his macula apicali vix conspicua terminatis: rostro superiore nigro, inferiore albo; pedibus pallidis.*

Long. tota 4·5, alæ 2·2, caudæ 1·7.

*Hab.* in reg. Amazonicâ, Marabitanas.

*Obs.* Affinis *H. cantator* (Bodd.), sed pectore flavo facile distinguenda.

This Ant-thrush, which is of the same form as, and nearly allied to, *H. cantator* (Pl. Enl. 700), was obtained by Natterer at Marabitanas, on the Rio Negro. The sexes are coloured alike.

6. *PTEROPTOCHUS THORACICUS*, sp. nov. (Pl. XXXVIII.)

*Supra fulvo-brunneus, dorso saturatiore; et hujus postici plumis laxis elongatis, pallido fulvo et nigro vix conspicue transvittatis: alarum tectricibus albo maculatis, fascia submarginali nigricante: subtus albus; pectore sulphurascente, plumis mediis pallido-rufo terminatis, plagam pectoralem formantibus: loris, superciliis et lateribus cervicis albo nigroque variegatis; pectore laterali cum ventre toto brunneis, albo nigroque squamulatis: remigibus et rectricibus fere unicoloribus fuscis; secundariorum externorum marginibus dorso concoloribus: rostro superiore nigro, inferiore albo; pedibus corylinis.*

Long. tota 6·6, alæ 3·0, caudæ 3·0, tarsi 1·1, rostri a rictu 0·8.

*Hab.* Amazoniam in ripis fl. Madeira.

*Mus.* Vindob. et P. L. S.

*Obs.* Species affinis *P. albicollis*, sed crassitie minore, rostro breviori, culmine recto, gonyde ascendente et macula pectorali conspicue distincta.

This bird forms a most interesting addition to the family *Pteroptochidæ*, and is, I believe, the first species of the genus found within the limits of the Brazilian Empire. In general colours it approaches nearly to *P. albicollis* of Chili, but is readily known by the pure-white breast and mid-belly and the curious pectoral spot. It is also considerably smaller in size, and rather smaller than *P. rubecula*—hitherto the smallest known species of the genus. The bill is differently shaped from that of *P. albicollis* or any of its allies: it is short and straight, the culmen being straight nearly to the extremity, and the gonyes curved upwards rather rapidly towards the point. It is compressed much as in *P. albicollis*. The tarsi are rather shorter and by no means so strong as in *P. albicollis*, and their anterior surface, as far as I can judge from my single specimen (the feet of which are not in very good order), nearly smooth, the divisions of

the scutella being obsolete, if not imperceptible. The claws are short and curved, as in other members of the genus. The wings are short and rounded, the fifth, sixth, seventh, eighth, and ninth primaries being nearly equal and longest. On the whole, the form is subgenerically (if not generically) distinct, and may stand as a separate section (for which I propose the name *Liosceles*\*) to connect *Pteroptochus* with *Agathopus*.



The late Dr. J. Natterer obtained his specimens of this bird at Salto do Girao, on the left bank of the Rio Madeira, in Oct. 1829. They were found on the ground in the forest. The following are his notes, as kindly communicated to me by Herr von Pelzeln:—

“Die Nasenlöcher haben einen stark erhabenen, ovalen, häutigen Deckel. Keine Barthaare. Iris dunkelbraun, die Augendeckel



graulichweiss. Der Schnabel ist schwarz, die Mundwinkel und die unterste Hälfte des Unterschnabels (der Länge nach) sind graulichweiss. Füße dunkelbraun, die innere Seite der Tarsen samt der oberen Seite der mittel- und inneren Zehen hautfarben, die Zehen aber ins Dunkelbraune übergehend, Klauen dunkelbraungrau. Der Schwanz sehr keilförmig.”

\* *λεῖος*, lævis, et *σκέλος*, crus.

7. *PIPRA NATTERERI*, sp. nov. (Pl. XXXIX.)

♂. *Læte viridis, pileo et uropygio niveis: subtus flava, gutture in viridem transeunte.*

♀. *Viridis, pileo vix cyanescente; uropygio corpore concolore: subtus flavescenti-viridis; ventre medio flavo.*

Long. tota 3·0, alæ 2·0, caudæ 1·0.

*Hab.* in imp. Brasiliensi, Borba et Enganho do Gama (*Natt.*).

*Mus.* Vindobonensi et P. L. S.

Natterer collected four examples of this beautiful species of Manakin (which is no. 737 of his MS. Catalogue) at Borba in January 1830—one male and four females. A skin previously obtained at Enganho do Gama, in August 1826, may probably be referable to the female of the same species, but differs slightly in having the crown less bluish.

*Pipra nattereri*, as I propose to call this bird, with Herr von Pelzeln's approbation (since its indefatigable discoverer left it unnamed), may be placed near *Pipra isidori* and *P. serena*. It is easily known, however, by its green body-colour and pure-white cap and rump. Herr von Pelzeln has kindly allowed me to acquire one of the females from Natterer's series, while a coloured sketch of the male kindly forwarded to me by the same obliging friend enables me to have the other sex represented in the accompanying plate.

The following extracts are from Natterer's MS. Journal, and relate to this species:—

“Weibchen, Enganho do Cap Gama, 10 August 1826, im hohen Wald, auf niederen Bäumen. Iris schmutzigweiss, Oberschnabel schwarzgrau, der Rand desselben (die Schneide) samt dem Unterschnabel hellgrau, Füße hellgelblichbraun, Klauen etwas dunkler. Dieses Weibchen unterscheidet sich von jenem von Borba durch den Mangel des bläulichen Scheitels und könnte vielleicht zu einer anderen Art gehören.

“Männchen (nicht in der Mause), Borba, Jänner 1830, aus dem Urwald. Iris schmutzigweiss. Der Rücken des Oberschnabels graulich schwarz, der Rand desselben und der Unterschnabel hellbläulichgrau. Die Füße sind hellgelblichbraun, Klauen grau. Der ganze Scheitel und Unterrücken blendend Weiss mit Seidenglanz, röthlich opalisirend.

“Weibchen alt, Borba, 9 Februar 1830, aus dem Urwald, einzeln. Iris schmutzigweiss. Oberschnabel graulichschwarz, der Rand desselben und der Unterschnabel blaugrau. Füße hellgelblichgrau. Die Klauen viel blässer, fast hautfarben.”

## 6. NOTES ON THE CRANIA AND DENTITION OF THE LEMURIDÆ.

By ST. GEORGE MIVART, F.L.S., LECTURER ON COMPARATIVE ANATOMY AT ST. MARY'S HOSPITAL.

Dr. Peters, in his ‘Reise nach Mossambique,’ has given a careful description, accompanied by excellent illustrations, of three small species of this family. Dr. Gray, in an interesting paper (revising

the species of Lemuroid animals and describing some new species) which was read before the Zoological Society in April 1863, has called attention to various details connected with the dentition and cranial structure of many species of *Lemuridæ*. Finally, Professor Huxley, in June last, in his careful and elaborate description of a great part of the anatomy of *Arctocebus calabarensis* (also read before the Zoological Society), noticed incidentally several very significant details regarding the dentition of the larger part of the family.

But much confusion still hangs over the definition and arrangement of the smaller forms of *Lemuridæ*—so much so, that any contribution tending towards the elucidation of these obscurities may perhaps be considered not altogether useless.

The genus *Hapalemur* (established by M. Isidore Geoffroy St.-Hilaire\*) is one about which, fortunately, there can be no doubt or ambiguity whatever.

It is represented in the national collection by two fine skins which were described by Dr. Sclater† under the name *Hapalolemur griseus*. A skull, extracted from one of them, is also preserved in the British Museum. The *Lemur griseus* of Geoffroy St.-Hilaire undoubtedly belongs to this genus (as Dr. Gray has determined), and also the *Cheirogaleus griseus* of Van der Hoeven, who has given an admirable representation of the skull and dentition‡. M. Gervais has also figured the dentition and external form§.

Dr. Gray gives as characters of this genus:—"Feet short and broad; cutting teeth  $\frac{2-2}{6}$ , the upper ones behind the other on each side, crowded on the inside of the canine. Ears short and hairy. Tail elongate, hairy. Hinder limbs much longer than the front ones."

In addition to these characteristics, however, other points of structure separate this form, in a very marked manner, both from the *Lemur milii* of M. de Blainville (with which it is associated by Van der Hoeven) and from De Blainville's *Lemur furcifer* (which is placed in the same genus with it by Dr. J. A. Wagner||), and indeed from every other genus¶ of the family to which it belongs.

The skull has the facial portion short, the cranium rounded and, as in *Lemur*, widest between the posterior roots of the zygomata.

There is on each side a small but distinct paroccipital process, which is laterally compressed and pointed at its extremity. In the only skull I have had the opportunity of examining, that at the British Museum, the sutures were remarkably obliterated, the nasal and the naso-maxillary sutures being all but undistinguishable. The præmaxilla, however, appears to be exceedingly small, so much so as

\* Catalogue Méthodique, Primates, 1851, p. 74.

† Proc. Zool. Soc. 1863, p. 161.

‡ Tijdschrift voor Natuurlijke Geschiedenis, 1844, pl. 1. fig. 1 a, b, c, d, & e.

§ Hist. Nat. des Mammifères, 1854, vol. i. p. 169.

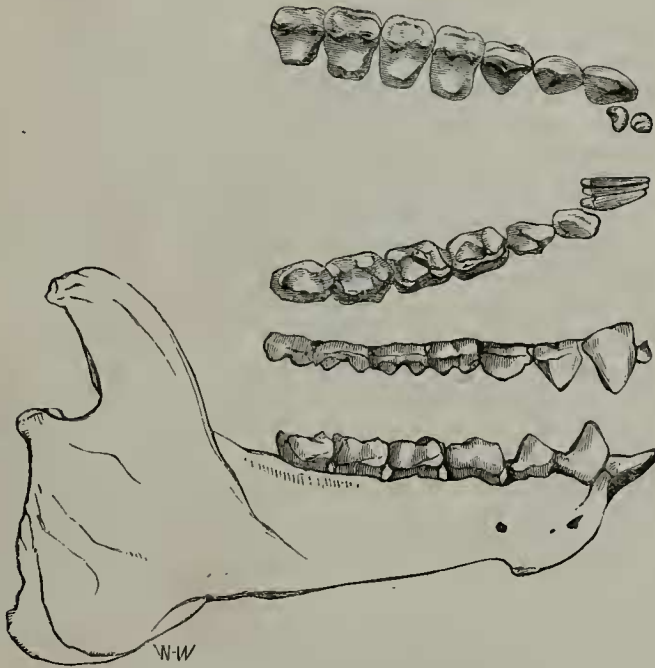
|| Säugethiere, Supplementband, 5te Abtheilung, 1855, p. 148.

¶ Dr. Dahlbom makes it only a subgenus of *Lemur*. (*Vide* 'Studia Zoologica,' p. 220.)



to be almost completely hidden by the canine when the skull is viewed laterally\*.

The bony palate is not produced backwards, the middle or most anterior point of its hinder margin being in a line with the middle of the last molar. The pterygoid-fossa is large. There is no conspicuous foramen for the internal carotid on the *basis cranii*, as there is in *Galago*, *Perodicticus*, and others. Beneath the outer part of the inferior margin of the orbit there is a large malar foramen.



*Hapalemur*. Scale,  $1\frac{1}{2}$  nat. size.

The mandible is perhaps the most characteristic † part of the bony framework of the head of *Hapalemur*. The angle is produced downwards, backwards, and somewhat inwards, as much as, or even more than, in the genus *Indris*.

The symphysis is very convex from above downwards, and the coronoid process is exceedingly produced.

The dentition of *Hapalemur* is quite peculiar. From the small size of the canine above and of the first premolar below, and the pretty equal vertical development of the premolars and molars, the whole series of teeth on each side of each jaw appears, when viewed laterally, remarkably uniform and equal—more so than in any other

\* This is not quite so in Van der Hoeven's figure, but in it the skull is not represented exactly in profile.

† M. Isid. G. St.-Hilaire, in his 'Catalogue des Primates,' p. 75, says that the mandible of his *H. olivaceus* is "d'une forme notablement différente dans sa partie postérieure." Unfortunately he does not add *how* it differs.

genus of the family, except perhaps *Microrhynchus*, with which it also agrees in presenting no diastema posterior to the two teeth above mentioned\*. When the grinding-surfaces of the upper teeth are looked at, the equality in size, from before backwards, of each dental series is absolutely greater than in any other genus of *Lemuridæ*.

The upper incisors are subequal and very small, and are, as Dr. Gray has pointed out, placed one before the other on each side, so that the hinder one is quite hidden by the canine when the teeth are viewed laterally †.

The upper canines are small; the first upper premolar on each side has but one cusp, but is more vertically extended than is the second premolar—a character by which *Hapalemur* differs from *Lemur* and agrees with the Galagos, Slow Lemurs, and others.

The third premolar is exceedingly developed, being the largest tooth in the upper jaw, slightly exceeding the first and second molars in size. It quite resembles these in shape, both when viewed laterally and from below. Each of these teeth has two pretty equally developed external cusps, and an internal one which represents the antero-internal cusp of a quadricuspidate molar. The postero-internal cusp is almost obsolete, as also the oblique ridge. The cingulum is very marked externally, but internally it is quite rudimentary. The last upper molar is also tricuspid, and intermediate in size between the second true molar and the second premolar, but very nearly equal to the former; so that the three true molars and the third premolar are more equal one to another than even in *Galago allenii* ‡, and the greatest difference between any two contiguous grinding-teeth in the upper jaw is between the second and the third premolars.

The lower incisors and canines, which are much as in *Lemur*, are rather short, and not by any means as long as is the mandibular symphysis.

The first lower premolar is but little developed vertically; and the second has but one external cusp.

The third premolar § has two well-developed external cusps, and in size and form resembles the first inferior molar, which is quadricuspidate, as are the two teeth posterior to it—the four hindermost grinding-teeth below being subequal in size, like those above. As in the upper jaw, so also in the lower, the greatest difference between any two contiguous grinding-teeth is between the second and third premolars.

Another well-marked and distinct generic form is that which Dr. Peters has described and figured under the name *Microcebus myoxi-*

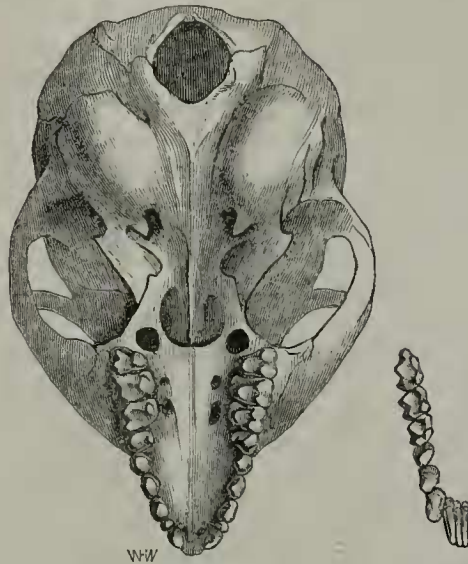
\* See De Blainville's 'Ostéographie,' *Lemur*, pl. 8.

† In Van der Hoeven's figure the hinder upper incisor is visible; but, as before remarked, in his plate the skull is not represented exactly in profile. In M. Gervais's two figures (*Hist. Nat. des Mamm.* p. 169), however, the second incisor on each side is represented as placed quite internally to the canine.

‡ Noticed by Prof. Huxley, see *ante*, p. 324.

§ In M. Gervais's figure (p. 169) the antero-external part of the second and third premolars appears to be prolonged forwards outside the postero-external part of the tooth next in front. This is not the case in the British Museum skull.

*mus*\*. A skull in the British Museum (which came from the Zoological Society's collection, and which is noticed and figured in Dr. Gray's memoir above quoted, under the name *Lepilemur murinus*)



*Microcebus minor* (*Lepilemur murinus* of Gray). Scale, twice nat. size.

certainly, as Dr. Gray remarks, "agrees well" with Dr. Peters's figure. It is in fact most undoubtedly of the same genus. The skin from which it was extracted, unfortunately, does not appear to be in the national collection; but there are two others considered by Dr. Gray to belong to the same species (though labelled *Galago minor*), and the dentition, in the only one of them in which the teeth are visible, agrees well, as far as it can be observed, with that of the skull just alluded to. Another small Lemur preserved in spirits in the British Museum (which also came from the Zoological Society's collection, and was named by Mr. Waterhouse † *Microcebus pusillus*, but which is labelled *Cheirogaleus smithii*, and described by Dr. Gray under that name ‡) also closely resembles Dr. Peters's *Microcebus*, the only difference in dentition which could be observed depending, perhaps, on the animal not having reached maturity.

In this form the ears are large and the tarsus rather elongated. Unfortunately I have had no opportunity of ascertaining, myself, the proportions of the tarsal § bones; but this section of the foot appears to equal about one-third the length of the tibia.

With regard to the skull, Dr. Peters notices the absence of any inflation of the mastoidal region of the *periotic*, the prolongation of

\* Reise nach Mossambique, p. 13, and plates 3 & 4, figs. 6-9.

† Cat. of Mus. of Z. S., 2nd edit. p. 12, no. 89.

‡ Proc. Zool. Soc. 1863, p. 143.

§ "Die Länge des Fersenbeins ist gleich einem Drittel des Unterschenkels."  
—Reise nach Mossambique, p. 17.

the bony palate back somewhat beyond the last molar teeth, and the very large size of the posterior palatine foramen,—also a defect of ossification in the palate on each side anterior to the palatine foramen (the openings being closed by membrane), the presence of an interparietal bone, and the great size of the premaxillæ, which join the nasals for one-third of the latter's external margin.

He also calls attention to the pointed and hooked character of the angle of the mandible, and to its very long and backwardly inclined coronoid process. In all these characters the British Museum skull agrees with the figure and description given by Dr. Peters, except that the palate is not quite so prolonged (the most anterior point of the hinder margin being on a line with the posterior edge of the last molars), and that there are two defects of ossification, instead of one, on each side of the palate; moreover, the condition of the sutures does not admit of perfect certainty as to the extent of the line of union between the *nasals* and *præmaxillæ*, which nevertheless appears to be about such as Dr. Peters describes. I may add that it agrees with Dr. Peters's figure in the absence of a malar foramen, in the sharp production of the angle of the mandible backwards but not downwards, and in the small extent of the projection of the *præmaxillæ* forwards beyond the incisors, or of the nasals above the anterior *nares*, so that the outline of the lateral boundary of this opening is not deeply concave when the skull is viewed laterally.

The *sphenoidal fissure* and the *foramen rotundum* are represented by a single and very large opening.

The anterior end of the inferior surface of the *periotic* develops a very marked process.

As to the dentition, Dr. Peters's remarks and delineations quite agree with the characters offered by the teeth of Dr. Gray's *Lepilemur murinus*. For the anterior and internal pair of upper incisors are nearly double the size of the posterior and external pair, and both of one side are plainly visible when the skull is viewed laterally. The upper premolars have each but one large external cusp, and are about equal in vertical extent, the first premolar being at least equal, in this respect, to the second. The three upper molars have each two pretty equally developed external cusps, and a large antero-internal cusp, which is connected by an oblique ridge with the postero-external one\*, and bounded internally, except in the last molar, by a cingulum. The postero-internal cusp is very rudimentary or absent. The greatest difference between any two contiguous upper grinding teeth is between the third premolar and the first molar, which is the largest. The last molar, which is the smallest of the three, is considerably larger than the last premolar.

In the mandible the three premolars have also but one large external cusp each, the molars having each two such. The lower premolars slightly exceed in vertical extent the three molars, the first two of which (about equal in size) are quadricuspidate, while the fifth (the largest of the lower series of grinders) is distinctly quincuspid.

\* As noticed by Professor Huxley in *Arctocebus*: see *antea*, p. 322.

According to Dr. Peters, there are 13 dorsal, 7 lumbar, and 3 sacral vertebræ\*.

To this well-marked form Dr. Peters, as has been said, has applied the generic name *Microcebus*, and justly so if it belongs to the same genus as does the *Microcebus rufus* of M. Isid. G. St.-Hilaire (the *Lemur pusillus* of Geoffroy and *Rat de Madagascar* of Buffon), which is the type of that genus.

The skull and tarsus of Geoffroy's *Lemur pusillus* have been figured by M. de Blainville under the name *Lemur murinus*†, and the external form and dentition by M. Gervais.

Dr. Peters notices as distinctive characters of the *Lemur pusillus* of Geoffroy, as compared with his (Dr. Peters's) *Microcebus myoxinus*, "much shorter ears, not half the length of the head; longer fingers and toes; a longer and more pointed snout, also noticeable in the skull; the greater production forwards of the *præmaxillæ*; the very much smaller size of the openings in the palate‡, and the shorter symphysis of the mandible."

I may add that, judging from M. de Blainville's and M. Gervais's figures, the *præmaxillæ* and *nasals* in *M. pusillus* are so much produced above and below the anterior *nares*, that the outline of the lateral border of this opening is (when the skull is viewed laterally) very deeply concave.

The upper incisors are also much more distant from the anterior margin of the *præmaxillæ*, though as much anterior to the canines as in *M. myoxinus*. Also the first premolar is less vertically extended than the second; but this is perhaps owing to the individual not being quite mature.

The two pairs of upper incisors are represented in M. Gervais's figure as equal; they are nearly so in M. de Blainville's figure, and they are described by him as "*sub-égales et très-petites*" §; but as those of his *Lemur milii* are also spoken of in the same phrase (although in the plate representing the skull of that species the anterior incisor is represented as decidedly larger than the posterior), I am inclined to believe that the anterior pair are really larger than the posterior in *Lemur pusillus* as well as in *Microcebus myoxinus*, the more so as it is almost impossible that so careful and accurate a naturalist as Dr. Peters should have omitted to notice such a striking difference between his *M. myoxinus* and the *L. pusillus* of Geoffroy as would have been the equality of the upper incisor teeth of the latter.

The formation of the *tarsus* also may, I think, for the same reason, be safely assumed to be similar in these two species.

The *L. pusillus* of Geoffroy has very often been associated with the Galagos on account of the structure of its foot—amongst others,

\* Reise nach Mossambique, p. 17.

† I assume that the *Lemur murinus* of De Blainville is the *Lemur pusillus* of Geoffroy. Both Dr. Peters and Dr. Wagner are satisfied on this point.

‡ The posterior palatine foramina, however, are still very large: see Gervais's 'Mammifères,' p. 173.

§ Ostéographie, *Lemur*, p. 35, pl. 11.

even by M. Isid. G. St.-Hilaire, who has placed it beside *Galago* in his group *Galagina*\*, and last of all by Dr. Gray†, who has made it a species of the genus *Galago*, under the name of *G. madagascariensis*, calling attention, however, to the shortness of the foot as represented in Buffon's figure. But, according to Dr. Peters, so far from approaching the Galagos more than does his *M. myoxinus*, the tarsus of Geoffroy's *L. pusillus* is proportionally shorter, the total length from the point of the snout to the root of the tail being 140 millimetres in the former, 145 in the latter, while the length of the foot in each, subtracting that of the fourth toe, is  $20\frac{1}{2}$  millimetres in *M. myoxinus*, but only 17 in *L. pusillus*.

None of the differences hitherto recorded appear to me to warrant the location of these two forms in separate genera‡ or even subgenera; unless therefore the upper incisor teeth, the first upper pre-molar, the structure of the tarsus, or some other part of the organization of the *L. pusillus* of Geoffroy should, on further examination, present differences in structure which have escaped Dr. Peters's observation§, both forms must rank as species of the genus *Microcebus*, as also the *Lepilemur murinus* of Dr. Gray; and the three species may be termed, respectively, *Microcebus pusillus*, *M. myoxinus*, and *M. minor* (the *Lepilemur murinus*|| of Dr. Gray). But, on the other hand, should hitherto unnoticed but important differences be found to exist between *M. pusillus* and the other two, then a new generic name will be required for *M. myoxinus*, *M. minor*, and their allies, as *M. pusillus* is the species to which the term *Microcebus* appertains.

Of the three forms classed by Dr. Gray in his genus *Cheirogaleus*, two only are represented in the national collection, there being one stuffed specimen, with the skull inside it, of *C. typicus*, and another similar one of *C. smithii*, also the specimen in spirits before spoken of as closely resembling Dr. Peters's *Microcebus*.

The two stuffed specimens (which are the types of the two species respectively) differ from *M. myoxinus* and *M. minor* in the much smaller size of the ears; but, as Dr. Gray justly remarks, "The ears are very apt to be unnaturally stretched in the stuffing, or the converse and allowed to shrink in the drying"¶. Moreover it should be remembered that, in some species at least of the family, the ears are exceedingly contractile\*\*.

\* Catalogue des Primates, p. 79.

† Proc. Zool Soc. 1863, p. 149.

‡ M. de Blainville notices that it has seven lumbar vertebræ, thus agreeing in this also with *M. myoxinus* ('Ostéographie,' *Lemur*, p. 12).

§ According to M. Gervais (*Mammifères*, p. 173), the *L. pusillus* of Geoffroy has three pairs of mammaræ; according to Dr. Peters, in *M. myoxinus* there are but two pairs!

|| To prevent confusion (as this species is not the *L. murinus* of M. de Blainville), I think it better to restore the specific name originally given to it by Dr. Gray in the *Ann. & Mag. of Nat. Hist.* 1842.

¶ Proc. Zool. Soc. 1863, p. 144.

\*\* This peculiarity was, as far as I know, first noticed in a large species of *Galago* described by Mr. A. D. Bartlett, and named by him *G. monteviri*. It had "the power of turning its ears back, and folding them up when at rest. When moving about, or in search of food, they spread out and stood upward and forward."—*Proc. Zool. Soc.* 1863, p. 231.

Of these two forms of so-called *Cheirogalei*, the *C. smithii* of Dr. Gray is, as he truly observes, "very like" *M. myoxinus*, but for the smallness of the ears (relatively larger than those of *C. typicus*), the length of the feet agreeing.

The dentition unfortunately cannot be well seen, but it agrees with that of *M. myoxinus* and *M. minor* in the preponderance of the inner upper incisors over the outer pair, in the three premolars having but one large external cusp, and in the great difference in size between the last premolar and the first molar; but Dr. Gray's *C. smithii* differs from them, and agrees with *M. pusillus*, in having the first upper premolar rather less vertically extended than the second; and should this arise from immaturity, which (for reasons which will appear in speaking of the genus *Lemur*) I suspect to be the case, then there will probably be a considerable distinction in absolute size between the adult *C. smithii* and the species *M. minor*, two skins of which (labelled *Galago minor*) are, as before stated, in the national collection.

The other and considerably larger form, named *C. typicus* by Dr. Gray, is, in spite of its greater size, immature, the third lower grinding-tooth, on one side, being a deciduous one. The first upper premolar is remarkable, being, as Dr. Gray observes, "large, conical, erect, like a small canine." In this species also the tarsus seems to be relatively shorter. The upper incisors resemble those of *M. myoxinus* and *M. minor*.

I think it better to leave this form, provisionally, where Dr. Gray has placed it, namely, side by side with his *C. smithii*, and (as this last cannot, as far as I have yet had opportunity of observing its characters, be generically separated from *M. myoxinus*, *M. minor*, and *M. pusillus*) to designate it *Microcebus typicus*, at the same time calling attention to the uncertainty of its position until its osteology and dentition are better known.

The third form included by Dr. Gray in his genus *Cheirogaleus* is the *Cheirogaleus milii* of Geoffroy. This is the true type of that puzzling and troublesome genus, but unfortunately it is not represented by either skin or skull in the British Museum. M. de Blainville has figured a side view of the cranium, showing the dentition\*, as also has Dr. Dahlbom†. Judging from these illustrations, *Cheirogaleus* appears to have considerable resemblance to *Microcebus*; and should the alleged characters separating these two genera prove on examination to be worthless, and *C. milii* incapable of generic separation from *M. pusillus*, then the name *Microcebus* will have to disappear altogether in favour of the more ancient designation *Cheirogaleus*.

In the preponderance of the inner over the outer upper incisors, *C. milii* agrees with *Microcebus*; but it differs, apparently, from *M.*

\* Ostéographie, *Lemur*, pl. 7.

† *Studia Zoologica*, vol. 1. tab. viii. figs. 32 & 32 a. Dr. Dahlbom's figures are not very faithful: in fig. 32 the outer upper incisor is represented as larger than the inner, while in fig. 32 a the inner pair of upper incisors greatly exceeds the outer pair.

*myoxinus*, *M. minor*, and *M. pusillus* in the existence of a considerable diastema between the upper canine and the first premolar, and between the latter and the second premolar, and in the broader angle to the mandible. The third upper premolar also appears to approach in size the first true molar more nearly than in *M. myoxinus*, *M. minor*, and *M. pusillus*, and to be less vertically extended than in them; but it is difficult even to judge from M. de Blainville's plate, as one cannot tell what to attribute to abrasion of the teeth. In the considerable vertical extension of the first as compared to the second premolar, *C. milii* approaches *M. typicus*. Unfortunately I have at present no means of knowing the structure of the palate, the form of the grinding-surfaces of the molars, or whether there is an interparietal bone—points I am also unable to ascertain as regards *M. typicus* and *M. smithii*. The principal reason, however, which would appear to me to justify the separation generically of *C. milii* from *M. myoxinus*, *M. minor*, *M. smithii*, and *M. pusillus*\*, is the alleged different and peculiar structure of the tarsus in the first named. That of *M. pusillus*, as figured (under the name *Lemur murinus*) by M. de Blainville†, shows an elongated calcaneum and naviculare, similar to that of the Galagos, though considerably less in degree, also an elongated cuboid; but the astragalus is normal. In *M. myoxinus*, as I have already stated, Dr. Peters's measurements show a somewhat greater length of tarsus. That it is similarly constructed, however, is to be inferred from his silence as to any difference in this respect between his *M. myoxinus* and *M. pusillus* (De Blainville's *L. murinus*), and the more so as he expressly asserts that in his *M. myoxinus* the calcaneum is one-third the length of the tibia, compares its tarsal structure with that of *Galago* and *Lemur*, and declares it intermediate between them. As far as I could ascertain in the specimen preserved in spirits in the British Museum (labelled *C. smithii* and so resembling *M. myoxinus*), the os calcis barely attains one-third the length of the tibia. The proportions of the naviculare and cuboid could not be ascertained, but I have no doubt that they are the same as in *M. myoxinus* and *M. pusillus*.

Now in *C. milii*, according to M. de Blainville‡, the tarsal bones are long; but here "c'est l'astragale, et non le scaphoïde seul, qui suit l'allongement assez prononcé du calcaneum, ce qui donne à chaque os du tarse de ce petit animal quelque chose d'assez particulier"; and this is said immediately after describing the tarsus of *M. pusillus* (De Blainville's *L. murinus*) with which it is contrasted. Now, if on examination the difference here indicated should prove to be considerable, it would be an important character, and, I think, justify a generic distinction between *Cheirogaleus* and *Microcebus*. But the two genera would still have many points of affinity; and, according

\* I do not add *M. typicus*, because I have, unfortunately, no means of ascertaining the structure of the tarsus in that species, and because, judging from the skin, that part appears to be relatively shorter than in the above-mentioned forms, as I have before remarked.

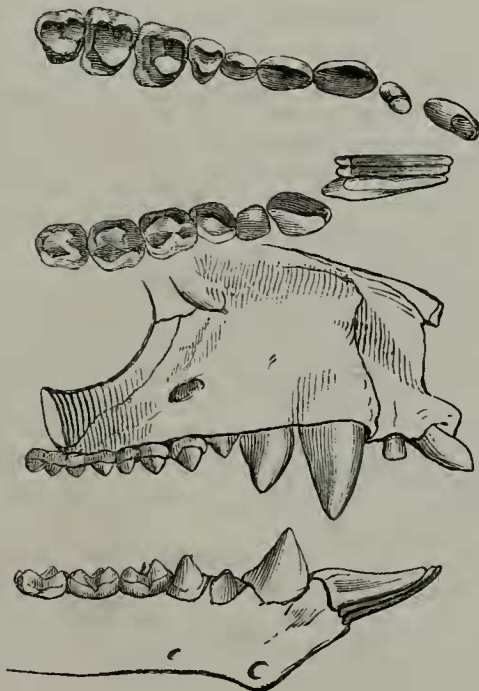
† Ostéographie, *Lemur*, pl. 10.

‡ Ibid. p. 12.



to M. de Blainville, *C. milii* agrees with *M. myoxinus* and *M. pusillus* (as doubtless with the other *Microcebi*) in the number of lumbar vertebræ.

Another well-marked and easily distinguished species (placed in the genus *Cheirogaleus* by Dr. J. A. Wagner and by M. Isid. G. St.-Hilaire\*) is the *Lemur furcifer* of M. de Blainville, the *Lepilemur furcifer* of Dr. Gray†. It is represented in the British Museum by a fine skin of an almost adult individual. The skull has been extracted, and is preserved in the osteological collection; unfortunately,



*Microcebus furcifer*. Scale, twice nat. size.

however, the posterior part of the cranium and the back walls of the orbits, together with the angles of the mandible, are wanting.

This species has large, long ears, and is readily distinguished by its black dorsal stripe bifurcating on the occiput. It is represented (not very well, however) in M. Gervais's 'Mammifères,' and also (under the name 'Cheirogale de Madagascar') in Dr. Chenu's 'Encyclopédie d'Histoire Naturelle.' The skull and dentition are figured by M. de Blainville‡.

Unfortunately I am again unable to give particulars as to the conformation of the tarsal bones in this Lemur; but the foot is certainly rather elongated, and the whole of the tarsus appears to exceed one-third the length of the tibia. The skull and dentition, however,

\* Catalogue des Primates, p. 77.

‡ Ostéographie, *Lemur*, pl. 7.

† Proc. Zool. Soc. 1863, p. 145.

differ both from *C. milii* and from *M. myoxinus*, *M. minor*, and *M. pusillus*; so that I have been almost inclined to propose for it a new generic name.

The skull has the facial part prolonged, the distance from the anterior end of the præmaxilla to the hinder border of the orbit very much exceeding the distance from that hinder border to the posterior extremity of the cranium—instead of being about equal to it, as in *C. milii*. The upper surface of the muzzle presents a marked antero-posterior convexity; and the mandible, when viewed laterally, has its inferior margin very strongly concave. Its angle is produced backwards, but not downwards; it is sharper than in *Cheirogaleus*, but not so sharp as in *Microcebus*. The malar foramen is absent or minute. The palate is slightly prolonged backwards, the most anterior point of its hinder margin being posterior to the hinder edge of the last molar. The posterior palatine foramina are large, as are also the præmaxillæ, which join the nasals for more than a quarter of their (the nasals') length. The upper incisors are much in advance of the canines, and the preponderance of the anterior over the posterior pair is very great, in which respect, as also in the four preceding points, this species resembles the *Microcebi*.

The upper canines are large; but the first upper premolar is a very characteristic tooth, being produced and elongated like a second canine; indeed it exceeds in vertical extent the second and third upper premolars more than the true canine exceeds them in *Hapalemur*, and is longer in proportion to the second upper premolar than in any other species of the family, although, as has been stated, *M. typicus* has a canine-like first upper premolar approaching in development that of this species.

The second and third upper premolars have each but one large external cusp, and are about equal in vertical extent (judging from M. de Blainville's figure, the second upper premolar not having come into place in the British Museum skull), though the third has a larger talon internally.

The first upper molar greatly exceeds the third premolar in size, and differs from it in having two nearly equally developed external cusps. It has also a large antero-internal cusp connected with the postero-external one by an oblique ridge. The postero-internal cusp is exceedingly minute and rudimentary. The second upper molar quite resembles the first in size and form; but the third is smaller than the two preceding, and its postero-internal cusp is quite obsolete. It exceeds, however, the third premolar in size; and the difference between the latter and the first molar in this respect is great, thus agreeing with the *Microcebi*, and differing from *Hapalemur* and, as we shall see, from the Galagos. Indeed in all the above-mentioned points the molars of De Blainville's *L. furcifer* resemble those of *Microcebus*; but there is a more strongly developed cingulum outside all the upper molars.

In the lower jaw the incisors and canines (which have the similarity in form and position common in the *Lemuridæ*) are extremely long, so much so as quite to equal in length the mandibular symphysis.

The first lower premolar is very produced and canine-like, much exceeding in vertical extent the second and third premolars, which, judging from M. de Blainville's figure (the second lower premolar, in the British Museum skull, not yet being in place), are about equal in this respect, and have but one large external cusp each. The three lower molars are subequal in size, and greatly exceed the third premolar, there being again a great difference in dimension between the latter and the first molar. The last lower molar has only a trace of a fifth tubercle, instead of being plainly quinquecuspid as in *M. myoxinus*, *M. minor*, and *M. pusillus*.

On the whole I think it better, for the present at least, to associate the *L. furcifer* of De Blainville with the species just mentioned, with which it has so many points in common that I feel persuaded its tarsal structure will, on investigation, prove essentially similar. In the development of the first upper premolar it resembles *M. typicus*, from which, however, it appears to differ in its much longer ears and somewhat longer tarsus. I call it then provisionally *Microcebus furcifer*.

The next form, the *Lepilemur mustelinus* of M. Isid. G. St.-Hilaire\*, is quite unknown to me, except from his notice and the short description and the figures of the external form and dentition given by M. Gervais†. Dr. Gray places it in the same genus with *M. furcifer*, quoting Dr. Dahlbom to the effect that, but for the upper cutting-teeth, the latter would be a *Lepilemur*. If, however, M. Gervais's representation and account of the dentition are correct, there are other differences besides the total absence, in the adult condition at least, of upper incisors; for, in the first place, it differs from *M. furcifer* in that the anterior upper premolar is not caniniform, and "ses molaires ont de l'analogie avec celles du Maki gris (*Hapalemur*) et des Indris"—certainly different enough not only from *M. furcifer*, but from any *Microcebus*! In the lower jaw there is an exceedingly large fifth tubercle to the last molar (differing in this from *M. furcifer*, though not from the other *Microcebi*); and the anterior portion of every lower grinder is produced forwards, overlapping the posterior part of the tooth next in front in quite a remarkable manner. The palate also (judging from M. Gervais's figure) differs from that of *Microcebus*, in having the most anterior point of its hinder margin on a line with the anterior part of the last upper molar, and in having the posterior palatine foramina inconspicuous. Finally, the shortness of the tail in this species, when considered in connexion with the other differences, is a very marked and exceptional character; so that, I think, *Lepilemur mustelinus* must be considered to constitute a distinct genus, at all events until details as to its dentition and the structure of its tarsus are made known.

The genera which have been reviewed hitherto are all from Madagascar only. The next group is composed of African species; and the geographical distinction is accompanied by marked structural differences, to which the genus *Lemur* (also exclusively from Madagascar) offers no exception. It would therefore have been exceed-

\* Catalogue des Primates, p. 75.

† Hist. Nat. des Mammifères, p. 170.

ingly remarkable had *M. pusillus* really had that affinity to the Galagos which has been so often assumed.

This next type of structure is presented by various species which have been arranged in several distinct groups, but which, I believe, constitute only one natural genus, though a large and somewhat varied one, admitting perhaps of subdivision into more or less doubtful subgenera. This large genus, *Galago*, contains, as I apprehend, *Otogale*, *Callotus*, and *Galago* of Dr. Gray, together with *Otolemur* of Dr. Coquerel, and *Hemigalago* of Dr. Dahlbom. It is well represented in the British Museum by a number of skins, skulls, and two complete skeletons, besides several specimens in spirits. As far as I have been able to observe, the whole of the species included in the genera above enumerated agree in the possession of the following common characters:—The ears are largely developed and more or less naked; and the tail is long. The foot is always long also; and this elongation is produced by the great length of the calcaneum and naviculare only\*, not, as in *Cheirogaleus*, by the prolongation of the astragalus, nor by having a cuboid almost as long as the naviculare, as is the case in *Microcebus*.

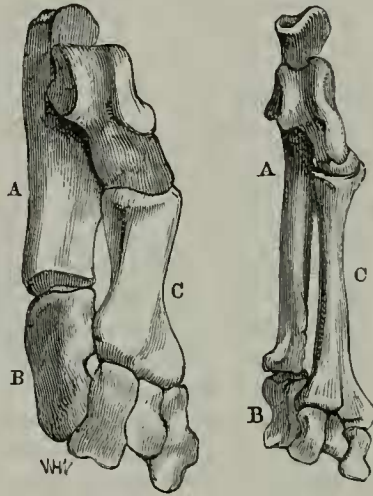


Fig. 1.

Fig. 2.

Fig. 1. Tarsus of *Microcebus*; Fig. 2. Tarsus of *Galago*. From De Blainville's 'Ostéographie,' but represented with the calcaneum (A) and cuboid (B) together of the same total length in each figure, the better to show the relative extent of the naviculare (C).

The length of these two bones (the calcaneum and naviculare) when in their natural position, and measured from the distal extremity of the second to the proximal end of the first, always exceeds four times the breadth of both bones measured at their narrowest parts, and when in their natural position also. The calcaneum is always more than one-third the length of the tibia.

In the skull the mastoidal region of the periotic is enlarged and

\* This is still more markedly the case in *Tarsius*.

inflated, differing in this respect from *Microcebus*, as Dr. Peters has pointed out. The foramen for the entrance into the skull of the internal carotid is very conspicuous on the basis cranii, being almost on the same transverse line as the foramen ovale, at the junction of the basi- and ali-sphenoids with the anterior end of the petiotic. The posterior palatine foramina are small, and the bony palate (completely ossified) has the most anterior point of its posterior margin on a line with the middle or even with the anterior end of the last molar\*.

The optic foramen is, as might be anticipated, very large. One opening takes the place of both the sphenoidal fissure and the foramen rotundum. There is no malar foramen, nor any interparietal, and the præmaxillæ do not join the nasals for so much as one quarter of the length of the latter.

As regards the dentition, the upper incisors are always very small and subequal; the first premolar always exceeds the second in vertical extent, but, like it, has only one large external cusp.

The third upper premolar, however (like the corresponding tooth in *Hapalemur*), has two large and pretty equally developed external cusps, as have also the molars; so that the four posterior grinding-teeth have a similar form, when viewed externally, and are also pretty equal in size, what inequality there is in this respect arising from the inferior size of the last molar. Viewed from within (*i. e.* looking at the grinding-surfaces), these four teeth are also seen to be more or less equal†, the last premolar and the first two molars having very nearly the same dimensions; for each of these three teeth has two internal cusps, as well as two external ones, and the postero-external one is connected with the antero-internal one by an oblique ridge; but the cingulum within is quite rudimentary or absent.

The last upper molar is in some forms quadricuspidate, in others tricuspid, the postero-internal cusp disappearing. The oblique ridge, however, persists, and the tooth is generally intermediate in size between the third premolar and the first two molars, which are the largest grinders in the upper jaw. The greatest difference between any two contiguous upper grinders is between the second and the third premolars, and not, as in *Microcebus*, between the third premolar and the first molar.

In the lower jaw there is the same equality as in the upper, between the third premolar and the first molar; and the last four teeth are nearly equal in size, except that the last molar is in most species quinquecuspid.

There appear to be constantly thirteen dorsal and six lumbar vertebræ; and, according to Dr. Peters‡, the base of the gall-bladder is not (as in *Microcebus* and *Lemur*) turned towards the back.

\* In M. Gervais's figure (p. 159) the palate is represented as rather elongated posteriorly: I have never seen such a condition in any *Galago*.

† The great similarity between the last upper premolar and the first molar above, in *Galago sennaarensis*, *G. maholi*, *G. allenii*, *G. garnettii*, *G. crassicaudatus*, and *G. pallida*, was first pointed out by Professor Huxley: see *ante*, p. 324.

‡ Reise nach Mossambique, p. 14.

The many forms to which the above characters apply may perhaps admit of being grouped together in certain subgenera, which may be distinguished as (1) *Galago* (*Otogale*), (2) *Galago* (*Otolemur*), (3) *Galago* (*Otolicnus*), and (4) *Galago* (*Hemigalago*).

The species which has been named by Dr. Gray\* *Otogale pallida*, and of which he has figured the skull and external form, is represented in the British Museum by two skins (types of the species), the extracted skulls of which are in the osteological collection. There is also a skin, with the skull inside it, which is the *Otolicnus apicalis* of M. Du Chaillu, and closely resembles *O. pallida*†.

These species or this species has a somewhat different aspect to that of the rest of the Galagos. The tarsus may perhaps be rather shorter in proportion to the tibia than in the species forming the subgenus *Galago* (*Otolicnus*) (with which subgenus *O. pallida* has much affinity as regards its cranial characters), but I have only been able to observe skins.

The skull is exceedingly like that of *Galago* (*Otolicnus*) *senaarensis*; but it differs from that, and from all other species of the genus, in the greater relative production and more canine-like form of the first upper premolar. The mandible is very low at the symphysis, and has its angle produced downwards as well as backwards. The last upper molar is quadrienspidate; but the last inferior molar is distinctly quinquecuspid in one individual, while in the other there can hardly be said to be more than four cusps, on one side at least‡. The next subgenus will include the *Otolicnus garnettii* of Ogilby (*Otogale garnettii* of Dr. Gray), the *Galago crassicaudatus* of Geoffroy (*Otogale crassicaudata* of Dr. Gray); also a new species or variety

\* Proc. Zool. Soc. 1863, p. 140, pl. xix.

† Dr. Gray considers it to be probably the same species: see note, *l. c.* p. 141.

‡ Not much reliance can, I think, be placed on the presence or absence of a fifth cusp on the last lower molar as a distinguishing character. Forms exceedingly alike in other respects differ in this, as in *Galago* (*Otolemur*). Not only may the same species vary (Professor Huxley noticed this to be the case in *Nycticebus*), but the very same individual offer a different structure on the two sides of the same jaw, as in the above-mentioned *Galago* (*Otogale*) *pallida*. The same variation also obtains in quite other forms of the order Primates. Thus in *Semnopithecus*, characterized by having five tubercles to the last lower molar, I have observed that the species *S. mitratus*, *S. cinereus*, and *S. nigrimanus* (in the osteological collection at the British Museum) have only four tubercles to that tooth. M. Isid. G. St.-Hilaire has also noticed a similar condition in some species of that genus (Archives du Muséum, t. ii.), and I have in my own collection a skull of a species of the same genus which has six distinct tubercles to the last inferior molar. Again, the Talapoin differs from the other species of *Cercopithecus* in having only three tubercles to the last inferior grinder, that being one of the characters on which M. Isid. G. St.-Hilaire founded his genus *Miopithecus* (Arch. du Mus. t. ii. p. 549, 1843).

But not only is the last grinder thus variable in form, but an additional grinding-tooth is not unfrequently developed. Thus the last-named author noticed a fourth true molar on each side of the lower jaw of a Malbrouck (see article "Cercopithèque," Dict. Universel d'Hist. Nat. t. iii. p. 306), and a *Cebus* with a supernumerary molar on each side of the upper jaw. Dr. Peters also has described and figured (Reise nach Mossambique, pl. 4. fig. 3) a *Galago* (his *Otolicnus crassicaudatus*) with a distinct, though small, fourth true molar on each side of the upper jaw.

as yet unnamed, which has been recently acquired by the British Museum from Dr. Kirk, and which came from the Zambesi, not only skins, but a skull of each of these three species being preserved in the Museum. It will also include the *Otolemur agisymbanus* of Dr. Coquerel\* (which, if distinct from the before-named species, is unrepresented in the national collection), and, finally, it must also include the *Galago monteiri* of Mr. Bartlett† (the *Callotus monteiri* of Dr. Gray‡). The skin of the type specimen of this species is in the possession of Mr. Monteiro, but he has presented the skull to the Museum of the Royal College of Surgeons.

These species agree well together, and, if they merit a distinct sub-generic name, the term *Otolemur* (proposed by Dr. Coquerel in 1859 for his *O. agisymbanus*) has, I believe, the claim of priority. Dr. Coquerel's species agrees with the others in all those points which the immature condition of the individual described allowed to be ascertained, and differs from them only as a young specimen might be expected to differ.

The species composing the subgenus *Galago* (*Otolemur*) differ from the rest of the Galagos by their larger size and in having the muzzle more produced, so that the length from the front margin of the orbit to a line drawn at right angles to the long axis of the cranium, and passing through the anterior extremity of the præmaxilla, exceeds the distance between two parallel lines (also drawn at right angles to the long axis of the cranium), one passing through the most anterior and the other through the most posterior part of the brim of the orbit. In all the other Galagos this proportion is reversed, and (when the skull is viewed laterally) the antero-posterior extent of the opening of the orbit exceeds that of the muzzle.

The angle of the mandible is produced downwards§ as well as backwards, in a marked manner. The last upper molar has mostly three, but sometimes four tubercles; the last inferior molar is either quadricuspidate or quinqucuspid. Probably the tarsus is not so long in proportion to the tibia as in the smaller Galagos, but I have not been able to observe any part of the osteology of these species except the skull. A representation, however, of the tarsus and tibia of this subgenus is given by M. de Blainville by mistake for that of the Aye-Aye||. The skull and external form of the same species, *G. (Otolemur) crassicaudatus*, are represented by Dr. Peters¶, *G. (O.) agisymbanus* by Dr. Coquerel\*\*. The skull of *G. (O.) garnettii*

\* Revue et Magasin de Zoologie, vol. xi. p. 457, plates 17 & 18 (1859). I think it probable that Dr. Kirk's Zambesi specimen may be specifically identical with this, and that both are but varieties of *Galago (Otolemur) crassicaudatus*.

† Proc. Zool. Soc. 1863, p. 231, pl. xxviii.

‡ Ibid. p. 145.

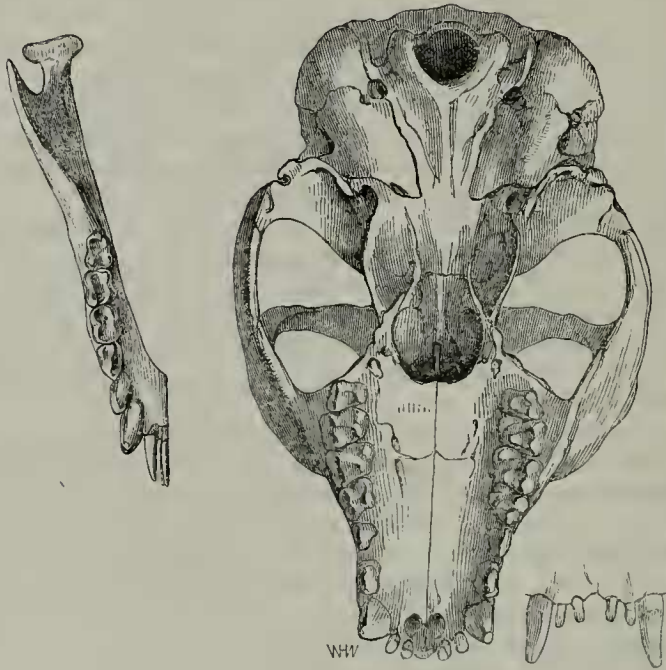
§ Least so in *Galago (Otolemur) monteiri*.

|| Ostéographie, *Lemur*, pl. 5. This mistake was first suspected by Professor Owen, and finally, on his suggestion, ascertained by M. Gervais (see Professor Owen's Memoir on the Aye-Aye, Trans. Zool. Soc. vol. v. p. 83). The tarsus is reproduced in pl. 21. fig. 23.

¶ Reise nach Mossambique, pls. 2 & 4.

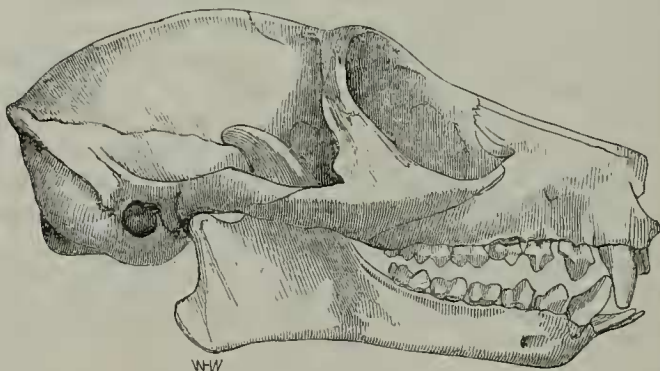
\*\* *Loc. cit.*

and the external form of *G. (O.) monteiri* are figured in the 'Proceedings of the Zoological Society'\* . Finally, by the kind permis-



*Galago (Otolemur) monteiri*, nat. size.

sion of the authorities of the Royal College of Surgeons, I am enabled to give a representation of the skull of the typical specimen of the last-named species.



*Galago (Otolemur) monteiri*, nat. size.

The next form which may admit of separation from the rest of the Galagos, and perhaps rank as a subgenus, is the *G. demidoffii*, of

\* *Loc. cit.*



which there are skins in the British Museum, also two specimens in spirits, an imperfect skull, and a complete skeleton. The skull and the external form are well represented in the 'Proceedings of the Zoological Society' \*.

This is the genus *Hemigalago* of Dr. Dahlbom, who gives for distinctive characters:—"Cranium spherical; ears large, oval, membranous, transparent; general form like that of *Galago*, but smaller; eyes large, projecting, separated by a distance of six or seven millimetres. Nose projecting, small, conically compressed, elongated anteriorly, projecting above the upper lip. Teeth as in *Galago*. Body short, rather thick, cylindrical. Members with the same proportions as those of *Galago*, except that the fingers are much more slender" †. These characters do not appear to me very distinctive, and I am convinced that this species cannot be separated generically from the other Galagos, and I have doubts as to the propriety of separating it from them even subgenerically. But the præmaxilla projects forwards and upwards in a peculiar way beyond the upper incisors, reminding one somewhat of *Loris gracilis*, and presenting an appearance, when the basis craniï is observed, similar to that seen in *Microcebus pusillus* as represented by M. Gervais ‡. The angle of the mandible is produced a little downwards as well as backwards. There is considerable difference in size between the second and third upper premolars. The last upper molar has only three tubercles, but the last lower one is quinquecuspid.

This species, as has been shown by Dr. Peters §, is undoubtedly the *Otolicnus peli* of M. Temminck.

The rest of the Galagos may be considered to constitute the subgenus *Galago* (*Otolicnus*) ||. In all of them, as has been said, the muzzle is shorter than the orbit when the skull is viewed laterally. The angle of the mandible is produced backwards, but scarcely downwards. The last upper molar has sometimes three tubercles, sometimes four; but the last inferior molar is always quinquecuspid. *G.* (*Otolicnus*) *allenii*, as Professor Huxley has pointed out ¶, differs from the other species in the great development of the "talon" in the second upper premolar; and as the last upper molar is quadricuspidate, this species is remarkable for the uniformity in size of its upper dental series. There is a skin of this species in the British Museum, which came from Fernando Po. It is marked 64. 4. 4. 17, and the skull extracted from it is no. 68 *a*. Another skin, very like the preceding, but from the Gaboon, is marked 64. 2. 18. 1, and the extracted skull is no. 68 *d*. There is also the skin and complete

\* 1863, page 148 and pl. xxxv.

† Dahlbom's 'Studia Zoologica,' p. 230, from the French translation by Dr. Coquerel, *loc. cit.*

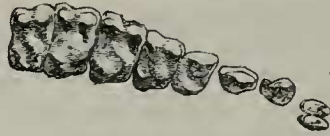
‡ Hist. Nat. des Mammifères, p. 173.

§ Proc. Zool. Soc. 1863, p. 381.

|| First used by Illiger in his 'Prodromus,' p. 74 (1811), and applied by him to the *Lemur galago* of Schreber, which is considered by his continuator, J. A. Wagner, as identical with his (Wagner's) *Otolicnus senegalensis* (a species of my subgenus *Otolicnus*): see Wagner's Supp. i. p. 292.

¶ See *ante*, p. 324.

skeleton of an individual which lived in the Society's Gardens\*. It came from the Cameroons river, and agrees with the specimen from Fernando Po.



*Galago (Otolicnus) allenii*. Scale,  $1\frac{1}{2}$  nat. size.  
Right dental series of upper jaw.

Dr. Gray, in his paper so often alluded to †, remarks on these forms, distinguishing one as “var. *gabonensis*.” I think the two forms are decidedly distinct species. The first, *G. (O.) allenii*, from Fernando Po, has the ears very large, the last upper molar quadricuspidate, the second upper premolar with so large a talon as to approach nearly the third premolar in size, and the incisors placed much in front of a transverse line connecting the two upper canines; while the second, *G. (O.) gabonensis* (from the Gaboon and the Cameroons), has the ears considerably smaller, the last upper molar tricuspid, the second upper premolar differing rather more from the third in size, and the incisors placed so little in front of the canines that they are more or less hidden by the latter when seen laterally.

Of the other species of *G. (Otolicnus)* I may observe that *G. (O.) sennaarensis* ‡ (of which there is a skull in the British Museum and another beautiful one in the Museum of the Royal College of Surgeons) has the first upper premolar a little more canine-like than have the other species. There is also a very great difference between the size of the second and third upper premolars; so that, as the last upper molar is but tricuspidate, this species differs from the other species of *Galago (Otolicnus)* in exactly the opposite direction from that in which *G. (O.) allenii* differs from them—namely, in having its upper grinding-series less equal than is theirs, instead of more so, though the third upper premolar is very large.

The Slow Lemurs, by which I mean the genera *Loris*, *Nycticebus*, *Perodicticus*, and *Arctocebus*, with much general agreement, nevertheless differ as to their dentition, as has been pointed out by Professor Huxley § in his memoir on the last-named genus. However, they all agree in having the mastoidal region of the periotic enlarged (as in the Galagos), and in having the foramen for the entrance into the cranium of the internal carotid plainly visible || in the basis cranii, at the junction of the basi- and ali-sphenoids with the anterior end of

\* This is the specimen noticed by Dr. Selater in Proc. Zool. Soc. 1863, p. 375, and figured in pl. xxxii.

† *Loc. cit.*, p. 146.

‡ The dentition is represented in Prof. Huxley's article on *Arctocebus*: see *ante*, p. 325.

§ See *ante*, p. 323, &c.

|| This is particularly large and conspicuous in *Arctocebus*.

the periotic. In all of them also, a single opening represents both the sphenoidal fissure and the foramen rotundum.

As regards the dentition, in all four genera the first upper premolar is longer\* than the second. The third upper premolar has only one large external cusp, while the first and second molars have each two well-developed subequal external ones; these two teeth, moreover, have always the oblique ridge running from the postero-external to the antero-internal cusp. There is a difference also between the third lower premolar and the first lower molar similar to that existing between the same teeth of the upper jaw.

In the Slow Lemurs also the gall-bladder has not its fundus directed towards the back, and the dorsal and lumbar vertebræ are both very numerous, the former being never less than fourteen, nor the latter less than seven in number,—twenty-one being thus the lowest number of both dorsal and lumbar vertebræ, taken together, which is found in any Slow Lemur.

It is an interesting fact, that, as far as concerns the skull and dentition, the Asiatic *Nycticebus* far more resembles the African *Perodicticus* than it does its oriental neighbour, *Loris*. It does so in the breadth between the orbits, in the non-prolongation forwards of the præmaxilla, in the length of the first upper premolar, in the smaller size of the last molar, both above and below, in the large size of the upper incisors, and in the shortness of the bony palate.

*Loris*.*Nycticebus*.*Perodicticus*. Nat. size.

On the other hand, the African *Arctocebus* differs more as regards its dentition (as Professor Huxley has pointed out) from its geographical fellow, *Perodicticus*, than it does from *Nycticebus*; while it has a certain resemblance to the Asiatic *Loris*. Thus it agrees with the latter in the large size of the last molar, both above and below, in the smallness of the upper incisors, and in a certain prolongation forwards of the nasal spine of the præmaxilla. *Arctocebus*, however, agrees with *Perodicticus* in having a smaller number of dorsal and lumbar vertebræ than *Loris* and *Nycticebus*; and it differs from all the other Slow Lemurs in the small vertical extent of its first upper premolar.

In the typical genus *Lemur* the mastoidal region of the periotic is not enlarged and inflated, thus differing from that of the Galagos and Slow Lemurs. The length of the muzzle, from the anterior extremity of the præmaxilla to the front margin of the orbit, exceeds the antero-posterior extent of the anterior opening of the latter. The præmaxilla is plainly visible when the skull is viewed laterally. The most anterior point of the hinder margin of the palate reaches, or nearly so, to the anterior end of the last molar. A malar foramen is

\* This is very slightly so in *Arctocebus*: see *ante*, p. 321, fig. 3.

mostly present, but sometimes absent. There is no conspicuous foramen for the internal carotid (as there is in the Galagos and Slow Lemurs) plainly visible in the basis cranii. The foramen rotundum is very close to the sphenoidal fissure, but is normally distinct from it. The Vidian foramen\* is obvious at the back of the orbit. The angle of the mandible is not produced downwards as well as backwards.

The upper incisors are always subequal, and the three upper premolars have each only one large external cusp; moreover the vertical extent of the first upper premolar falls more or less short of that of the second. This is the case in even aged skulls, and consequently is certainly *not* the effect of immaturity, as was suspected to be the case in *Microcebus smithii* and *M. pusillus*, the only forms of those we have yet reviewed in which the first upper premolar is shorter than the second. The three upper molars have each two pretty equally developed external cusps, one large antero-internal one, and a very large internal cingulum, which is most developed at the anterior part of the inner side of each tooth. Of the three molars, the third† is the smallest (the first and second being subequal), but it exceeds the third upper premolar in size. There is a great difference between this latter tooth and the first upper molar; but this difference is most marked when the teeth are viewed from without, when the third premolar, though, as has been said, it has but one external cusp, is seen (*Lemur* in this differing from *Galago*) to surpass the first molar in vertical extent.

In the lower jaw the incisors never equal in length the mandibular symphysis. The three premolars have each only one large external cusp (the molars, again, having two); and the second premolar is not quite equal in height to the third, which surpasses in this respect the first lower molar. The last inferior molar is always smaller than the two preceding ones.

I have been quite unable to detect any cranial or dental characters which would justify a subdivision of the genus *Lemur*. The dorsal vertebræ are either twelve or thirteen in number; in the first case there are seven lumbar vertebræ, in the other there are six‡. According to Dr. Peters, the gall-bladder has its base turned towards the back.

The order of succession in which the permanent teeth come into place in this family appears to be subject to some variation. Unfor-

\* The existence of the "Vidian canal" in Apes and other Mammals, and its distinctness from the so-called Vidian canal of Cuvier (mentioned in 'Leçons d'Anat. Comp.'), was pointed out by my lamented friend Mr. H. N. Turner, Jun., in the Proceedings of the Zoological Society, 1848, p. 72. I have noticed it, amongst the *Lemuridæ*, in *Loris*, *Nycticebus*, *Perodicticus*, and *Galago*, as well as in *Lemur*.

† This, together with the proportions of the cingulum, tells against the Lemurine affinity of the fossil described and figured by Rüttimeyer, in his 'Eocène Säugethiere,' under the name *Cænopithecus lemuroides*. I know no species of the *Lemuridæ* in which the last upper molar is the largest. In *Tarsius* the last upper molar is very much the same size as the second.

‡ In the second edition (1835) of the 'Leçons d'Anat. Comp.,' tome i. p. 178, a *Lemur* (*autre Maki*) is mentioned as having 12 dorsal, 8 lumbar, and 3 sacral vertebræ.

tunately I have been able to obtain but scanty materials from which to form a judgment. There are two skulls of the genus *Lemur* in the British Museum, one in the Museum of the Royal College of Surgeons, and another in my own collection, all of which retain more or less of the milk-dentition. The skull of *Microcebus furcifer* in the national collection is also immature.

M. de Blainville has given representations of an immature condition of the teeth in *Indris*, *Propithecus*, *Microrhynchus*, and *Loris*\*. M. Gervais has done the same for *Hapalemur*†, and Prof. Van der Hoeven for *Perodicticus*‡.

Of the incisors, I may remark that the condition noticed by Sundevall in a young *Galago teng* (namely, the presence of three incisors on each side above§) has not come under my observation.

Of the deciduous grinders, the first upper one nearly resembles its vertical successor, the second has also much resemblance to the tooth which replaces it; but the third upper deciduous molar (as might be anticipated) is very unlike its vertical successor, and very like the first upper molar. It has, indeed, two well-developed and pretty equal external cusps, one large antero-internal one, and a marked internal cingulum, not, however, extending so far forwards as in the first molar.

In the lower jaw the first deciduous molar resembles the first premolar: but the second deciduous grinder is like the third deciduous one; and *both* differ from their respective vertical successors, and resemble the first inferior molar||. As I have said, the order in which the permanent teeth appear does not seem to be constant. For example, in a *Lemur catta* in the British Museum, the second upper premolar is coming into place while the third deciduous molar still remains; in a *L. macaco*, on the other hand, the second upper premolar is also coming into place, but here the third deciduous molar is already shed, and the third premolar established in its place. In *Microcebus furcifer* the second premolar is evidently the last to appear both in the upper and in the lower jaw. In *M. typicus* the canines¶ are in place, but not the third inferior premolars. In *Loris gracilis* (as represented by M. de Blainville) both the upper and lower canines, the large canine-like first lower premolar, and the whole of the molars, both above and below, appear to be in place, and yet the third inferior deciduous molar is retained. Altogether it is certain that very frequently (and, I am inclined to believe, almost, if not quite always) the whole of the molars, both above and below, and the canines come into place before some one or other of the premolars,

\* *Ostéographie, Lemur*, pl. 11.

† *Hist. Nat. des Mammifères*, p. 169.

‡ *Tijdschrift voor Natuurlijke Geschiedenis*, 1844, pl. 1. fig. 3.

§ *Kongl. Vetensk. Akad. Handling.* 1842, p. 203. May not this condition have arisen from the coexistence of certain deciduous and permanent upper incisors?

|| In Mr. Murray's plate of *G. demidoffii* (in the *Edinb. New Phil. Journal*, 1859) the second deciduous inferior molar, as well as the third, is represented with two large, subequal, external cusps, thus agreeing with *Lemur*.

¶ I was unable to observe the hinder molars.

in the genera *Lemur*\*, *Microcebus*, and *Galago*, as well as in the Slow Lemurs. In those genera in which the number of teeth is less (viz. *Indris*, *Propithecus*, and *Microrhynchus*), the two upper and lower premolars appear† to come into place before the last molars or the canines; but I believe that, in all the genera that have thirty-six teeth, it is a premolar which is the last tooth to take its place in the permanent dentition‡, and that in all without exception the first molar, both above and below, is always in place before the hindermost premolar. This fact establishes the dentition of *Propithecus* (and therefore doubtless of *Indris* and *Microrhynchus* also) as consisting of two premolars and three molars on each side of each jaw, and not (as, from the analogy of the difference between the Marmosets and the other American Monkeys, might have been considered not improbable) of three premolars and two molars. For M. de Blainville has figured an immature *Propithecus* cutting the last three grinders in each jaw, and the most anterior of the three is the most advanced. It is therefore undoubtedly a true molar, as, had it been a third premolar, the tooth behind it would have come into place long before it, instead of, as it does, after it.

With respect to the remaining forms of *Lemuridæ*, I have it in my power to say but little, not having had the opportunity of seeing a skull either of *Propithecus* or of *Microrhynchus*.

The dentition of *Indris* has been recently described by Professor Huxley§, who has noticed how the teeth differ in form, as well as in number, from those of the preceding genera.

The skeleton of *Indris* is in many ways remarkable; and it would be interesting to know if the other two genera with the same number of teeth agree with it in the largely developed paroccipital process, the short bony palate, and the very large mandibular angle, or in the remarkable antero-posterior elongation of the cervical vertebræ, the large number of lumbar vertebræ||, or in the peculiar ilium with its remarkable process¶ (apparently answering to the anterior inferior spinous process) projecting above the acetabulum.

The skull and dentition of *Microrhynchus* are both figured by M. de Blainville\*\*, also by Van der Hoeven††. A representation of the skull is also given by Vrolik‡‡.

\* In *Hapalemur* the last molar, both above and below, appears to come into place after the canines and premolars (see Gervais, *Hist. Nat. des Mamm.* p. 169); but as in this species the third premolar resembles the first molar, the apparently third premolars may be deciduous teeth.

† I have seen no skulls of these species, and can only judge from M. de Blainville's representations.

‡ It is on this account that I think it probable that the skull of *M. pusillus* (represented by De Blainville) and the specimens (before spoken of) of *M. smithii* are immature, the shortness of the first upper premolar being probably due to its not having yet fully descended.

§ *Ante*, p. 326.

|| A point of resemblance to the Slow Lemurs.

¶ Noticed by Professor Owen in the 'Osteological Catalogue' of the Museum of the Royal College of Surgeons, vol. ii. p. 718.

\*\* *Ostéographie, Lemur*, pls. 8 & 11.

†† *Tijdschrift*, pl. 1. fig. 6.

‡‡ Todd's *Cyclopædia of Anatomy and Physiology*, vol. iv. p. 215.

According to these representations, the dental series appear remarkably uniform in vertical extent when the skull is viewed laterally, the canines being moderately produced, and the premolars very evenly developed, recalling the condition presented by *Hapalemur*.

When the grinding-surfaces of the teeth are surveyed, a great resemblance to *Indris* is evident, and, excepting the small size of the upper incisors, the structure of the teeth appears to be much as in that genus; and, as far as can be ascertained from the representation of the immature dentition given by M. de Blainville, *Propithecus* also exhibits a great similarity. But on these genera, on account of want of materials, it is not my present intention to comment.

And now having thus reviewed some of the cranial and dental characters of the various genera of *Lemuridæ*, it remains to endeavour by the help of these characters to define and arrange the component groups.

But before doing so I may remark that the more carefully the whole of the Primates are studied, the more do the differences in structure become manifest between the Lemur-like\* animals and all the higher members of the order.

Professor Huxley, in his last Hunterian Course of Lectures, called attention to the great differences between these groups, and to the much wider interval between the *Simiadæ* and the *Lemuridæ*, than between the former and the *Anthropodidæ*, enumerating at the same time the many marked characters separating those groups. Professor Van der Hoeven †, at the Meeting of the British Association in 1860, had before noticed many of these distinctive characters.

I have long entertained the conviction, which recent researches, especially those of Professor Huxley, have strongly confirmed and strengthened, that these two groups constitute two very natural suborders.

Wonderful as is the chasm separating Man, physiologically considered, from the highest Apes, I am yet unable to see how it can possibly be denied that, as regards form and structure (attention being especially paid to essential, as distinguished from adaptive characters), he is more nearly related even to the Marmoset, than is the Marmoset to any Lemur-like animal whatever. I propose, then, to divide the Primates into two suborders—the first to include Man and all the Apes, Monkeys, and Baboons, as well as the Marmosets; and for this first suborder I venture to suggest the name *Anthropoidea*; the second to contain the Lemurs, Slow Lemurs, Galagos, the Tarsier, and the Aye-Aye, and to be called *Lemuroidea*.

To the remarkable characters above referred to, as enumerated by Professor Huxley in his recent course, I have to add that, as far as I

\* It would be exceedingly convenient to have a *vernacular* general name to designate these creatures, and another for the higher Primates, exclusive of Man,—if, for example, we were to call all the latter (from the Gorilla to the Marmoset inclusive) “Apes,” and for the Lemur-like Primates to employ the convenient Germanism “Half-apes.”

† *Vide* Report of the 30th Meeting of the British Association (1860), London, 1861, Trans. Sect. pp. 134–136.

have yet had opportunity to observe, in all the *Anthropoidea* the posterior cornua of the os hyoides exceed in length the anterior cornua; in all the *Lemuroidea* this proportion is reversed. Also that in all the *Anthropoidea* the internal carotid enters the cranium after traversing a canal passing through the bony periotic mass, which it enters at its posterior part; in all the *Lemuroidea*\*, on the other hand, the internal carotid enters the cranium without traversing such a canal†, and mostly at the junction of the basi- and alisphenoids with the anterior end of the periotic. Finally, in all the *Anthropoidea* the foramen rotundum is normally distinct from the sphenoidal fissure‡; in all the *Lemuroidea* the two are very slightly separated, and in most species but one opening represents both these apertures.

The suborder *Lemuroidea* appears to be naturally divisible into the three families *Lemuridæ*, *Tarsidæ*, and *Cheiromyidæ*—*Galeopithecus*, as I believe, forming no part of the order Primates. To the already well-known distinctions between these three groups I may add that in the *Tarsidæ* the third digit of the hand is the longest, while the second and fourth digits are nearly equal—a combination which, I believe, occurs in no other species of the suborder. Again in *Tarsius* alone, of all the *Lemuroidea*, is the orbit closed behind by a union of the malar with the alisphenoid§. This reappearance of a marked and exceptional character amongst Mammals (one otherwise quite peculiar to the *Anthropoidea*) is most interesting, as, if *Tarsius* is thus demonstrated to have a near connexion with the higher Primates, then, *à fortiori*, the higher *Lemuroidea* must have such also, and thus we have a strong argument against the complete separation, as a distinct order, of the last-named group, and a reason for their merely *subordinal* distinction.

In defining and grouping together the genera of *Lemuridæ*, it is particularly desirable to obtain precise and definite distinctions. As Dr. Peters justly observes||, mere external characters are of little

\* Having some doubts as to *Cheiromys*, Professor Owen very courteously furnished me at once with the information I required, and which his notes could alone supply.

† Unfortunately I have not had an opportunity of injecting and dissecting a specimen of the genus *Lemur*, and am therefore unable to speak of the course of the internal carotid in that form, except in the above negative way.

‡ There are two skulls of Gibbons in the Museum of the Royal College of Surgeons in which one opening appears to represent both the *foramen rotundum* and the *sphenoidal fissure*; in other skulls of that genus, however, the two openings are very distinct. In *Hapale* the *foramen rotundum* is not readily seen when the skull is viewed anteriorly, being hidden by the ingrowth of the alisphenoid; and when visible, it is so small and distant from the sphenoidal fissure as to look like a very large *Vidian foramen*.

§ In examining a skull in the British Museum I felt strongly persuaded that such a union existed, but doubted the accuracy of my observation on account of Professor Van der Hoeven's direct assertion to the contrary, given in the Report of the British Association at Oxford, 1860, Tr. Sec. p. 134. But, as Burmeister represents this union most distinctly in several views of two distinct skulls (see 'Beiträge zur n. Kenntniss d. G. *Tarsius*,' tab. 7. figs. 1, 2, 8, & 9), I think it possible that Prof. Van der Hoeven may have formed his opinion on a skull presenting some individual variation, or perhaps even have overlooked the true line of union.

|| Reise nach Mossambique, p. 18.



value; and Dr. Gray has called attention\* to the errors likely to arise from placing reliance on such characters as the apparent size and form of the ears in stuffed specimens, as also† to the undecided nature of such distinctions as “hind legs, ears, and eyes very developed,” and “hind legs, ears, and eyes extremely developed,” employed by M. Isid. G. St.-Hilaire in his Catalogue of Primates.

But the unsatisfactory results arising from the employment of external characters alone become manifest when they lead a naturalist of such vast experience and acuteness of observation as Dr. Gray to separate widely his “*Callotus*”‡ from his *Otogale*. Nor can I regard as any more tenable the dissociation by him of *Microrhynchus* from *Indris* and *Propithecus*, and its approximation to *Galago*, on similar grounds. So far from the shortness of the snout and small size of the face, as compared to the cranium proper, in *Microrhynchus* being an important distinction between it and *Indris* and *Propithecus*, it is just such a difference as we might expect to find between closely allied species of Primates of very different size,—the relative size of the brain varying inversely with the absolute size of the entire body.

I doubt whether we have as yet materials sufficient to construct a strictly natural arrangement of the genera of *Lemuridæ*, but, as far as I have the means of judging, think they may best be grouped together in the four subfamilies *Indrisinæ*, *Lemurinæ*, *Nycticebinæ*, and *Galagininae*; and the genera may I think be thus arranged:—

#### LEMUROIDEA.

INDRISINÆ . . . . .	{	<i>Indris.</i> <i>Propithecus.</i> <i>Microrhynchus.</i>
LEMURINÆ . . . . .	{	<i>Lemur.</i> <i>Hapalemur.</i> <i>Microcebus.</i> <i>Cheirogaleus?</i> <i>Lepilemur.</i>
NYCTICEBINÆ . . . . .	{	<i>Nycticebus.</i> <i>Loris.</i> <i>Perodicticus.</i> <i>Arctocebus.</i>
GALAGININÆ . . . . .	{	<i>Galago.</i>
TARSIDÆ . . . . .		<i>Tarsius.</i>
CHEIROMYIDÆ . . . . .		<i>Cheiromys.</i>

Owing to this scarcity of materials, I have not attempted to work out the species; I therefore by no means intend to imply that I consider all the forms separately enumerated in the following list as,

\* Proc. Zool. Soc. 1863, p. 131.

† Ibid. p. 129.

‡ In justice to Dr. Gray I must add that he had no means of observing other than external characters of *Galago monteiri* (his *Callotus*) when his paper was written, the type of the species being then alive, and extremely unwilling to allow any examination of his dental structure.

without doubt, specifically distinct. I have provisionally adopted some of them on the authority of others, but in all cases doing the best I could to elucidate their synonymy. Except in a few genera, I have not thought it necessary to mention the species.

### Suborder LEMUROIDEA.

#### Family 1. LEMURIDÆ.

##### Subfamily 1. INDRISINÆ.

*Characters.*—I.  $\frac{2-2}{2}$ . C.  $\frac{1-1}{1-1}$ . P.M.  $\frac{2-2}{2-2}$ . M.  $\frac{3-3}{3-3}$ . = 30.

#### Genus 1. INDRIS, Geoff. St.-Hilaire (1796).

*Indris*, Geoff. St.-Hilaire, Mém. sur les Makis, 1796; Tabl. des Quad. 1812; Desmarest, Mamm. p. 96; A. Smith, S. Afr. Jour. ii. p. 27, 1835; Isid. G. St.-Hilaire, Cat. des Prim. 1851, p. 67; Gray, P. Z. S. 1863, p. 132; Vinson, Compt. Rend. lv. p. 829; Dahlbom, Studia Zool. p. 200.

*Lichanotus*, Illiger, Prod. (1811) p. 72; Van der Hoeven, Tijds. p. 43; Wagner, Schreb. Supp. i. p. 256, v. p. 140.

*Pithelemur*, Lesson, Species des Mam. (1840) p. 208.

*Indri*, Fischer, Syn. (1829) p. 72; Anat. der Maki (1804) p. 15.

#### Genus 2. PROPITHECUS, Bennett (1832).

*Propithecus*, Bennett, P. Z. S. 1832, p. 20; Less. Spec. p. 219; Isid. G. St.-Hilaire, Cat. Prim. p. 68 (1851); Dahlb. Stud. Zool. p. 203.

*Habrocebus*, Wagn. Schreb. Supp. i. p. 260, v. (1855) p. 141.

*Macromerus*, A. Smith, S. Afr. Quart. Journ. 2nd ser. ii. p. 49 (1833).

#### Genus 3. MICRORHYNCHUS, Jourdan (1834).

*Microrhynchus*, Jourdan, Thèse inaug. à la Fac. des Sc. de Grenoble (1834); Gray, P. Z. S. 1863, p. 141.

*Lichanotus*, Illiger, Prod. (1811) p. 72; Van der Hoeven, Tijds. p. 44.

*Avahis*, I. G. St.-Hil. Leçons de Mamm. 1835; Cat. Prim. (1851) p. 68.

*Habrocebus*, Wagner, Schreber, Supp. i. p. 257, v. (1855) p. 140.

*Indris*, A. Smith, S. Afr. Journ. (1835) ii. p. 27; Geoff. *l. c.* (1796 & 1812); Desm. Mamm. p. 97.

*Indri*, Fischer, Syn. p. 73; Anat. der Maki (1804) p. 16.

*Semnocebus*, Less. Species (1840) p. 209.

##### Subfamily 2. LEMURINÆ.

*Characters.*—I.  $\frac{2-2}{4}$ \*. C.  $\frac{1-1}{1-1}$ . P.M.  $\frac{3-3}{3-3}$ . M.  $\frac{3-3}{3-3}$ . Tarsus short, or with the cuboid and naviculare subequal in length; hind

\* I.  $\frac{0}{4}$  in *Lepilemur*.

limbs considerably longer than the fore limbs ; tail at least equalling two-thirds the length of the body ; mastoidal region of the periotic not inflated ; dorsal and lumbar vertebræ together never exceeding twenty ; gall-bladder with its base turned towards the back\*.

*Hab.* Madagascar.

Genus 1. LEMUR, Geoff. St.-Hil. (1796).

*Lemur*, Linn. Syst. Nat. ed. 10. p. 30 ; Geoff. St.-Hilaire, Mém. sur les Makis (1796) ; Illiger, Prod. p. 73 (1811) ; Fischer, Syn. p. 73 ; Anat. der Maki, p. 17 ; Desm. Mamm. p. 97 ; Van der Hoeven, Tijds. p. 32 ; Wagner, Schreber, Supp. i. p. 262, v. p. 141 ; Gray, P. Z. S. (1863) p. 136 ; I. G. St.-Hilaire, Cat. des Prim. p. 70 ; Dahlb. Studia Zool. p. 211.

*Prosimia*, Briss. Règ. Anim. p. 220 (1756) ; Less. Species des Mamm. p. 220 ; Smith, S. Afr. Journ. ii. p. 28 (1835) ; Gray, P. Z. S. (1863) p. 137.

*Varecia*, Gray, P. Z. S. (1863) p. 135.

*Characters*.—Muzzle elongated ; tarsus short ; upper incisors subequal, both pairs anterior to the canines ; upper molars with very large internal cingulum ; first upper premolar shorter than the second ; all upper premolars with only one large external cusp ; first upper molar considerably exceeding the third premolar in size ; upper canines very large ; sphenoidal fissure and foramen rotundum normally distinct ; generally a large malar foramen ; carotid foramen not obvious on the basis crani ; angle of mandible not produced downwards.

Genus 2. HAPALEMUR, I. Geoff. St.-Hil. (1851).

*Hapalemur*, I. Geoff. St.-Hil. Cat. des Prim. p. 74 ; Gray, P. Z. S. (1863) p. 141.

*Hapalolemur*, Giebel (1859), Säug. p. 1018 ; Sclater, P. Z. S. (1863) p. 161.

*Lemur* (subgenus *Hapalemur*), Dahlb. Studia Zool. p. 220.

*Lemur* (*griseus*), Fischer, Anat. der Maki, p. 24 (1804).

*Lemur* (*cinereus*), Fischer, Syn. p. 77 (1829) ; Geoff. Mag. Encycl. i. p. 20 ; Desm. Mamm. p. 101.

*Chirogaleus*, Van der Hoeven, Tijds. pp. 30–38, t. 1. f. 1 ; Wagner, Schreb. Supp. i. p. 276, v. p. 148.

*Semnocebus* (jeune âge), Less. Species des Mam. p. 212.

*Maki gris*, Buff. Supp. vii. t. 34.

*Characters*.—Muzzle short ; tarsus short ; upper incisors sub-

\* This distinction is given by Dr. Peters (Reise nach Mossambique, p. 14, and Proc. Zool. Soc. 1863, p. 382), but he does not refer to *Hapalemur* ; its condition in that genus is unrecorded, and, I believe, unknown. Other characters, above enumerated, such as the structure of the tarsus, the number of dorsal and lumbar vertebræ, are, as well as the position of the gall-bladder, unknown to me in certain species, as *Microcebus furcifer*, *M. smithii*, *M. typicus*, *Chirogaleus milii*, and *Lepilemur murinus*, as also the condition of the mastoidal region of the periotic in the last.

equal, but the posterior one on each side quite internal to the canine, which is small. First premolar above longer than the second, but the dental series on each side very nearly equal; third premolar above shaped like the upper molars, which it exceeds in size. The molars and third premolars above with a well-marked external cingulum, but with the internal cingulum quite rudimentary. A paroccipital process. A large malar foramen; carotid foramen not obvious in the basis cranii; angle of mandible exceedingly large, and produced downwards and inwards, as well as backwards.

The type specimen is in the Museum at Paris.

### Genus 3. MICROCEBUS, Geoff. St.-Hil. (1828).

*Microcebus*, Geoff. St.-Hil. Cours sur les Mamm. (1828) leç. vi. p. 26; Wagner, Schreber, Supp. i. (1840) p. 277, v. (1855) p. 153; Dahlb. Studia Zool. p. 231; Isid. Geoff. St.-Hil. Cat. des Primates, p. 79; Peters, Reise nach Mossamb. p. 13.

*Chirogaleus*, Wagner, Schreb. Supp. v. p. 147; Dahlb. Studia Zool. p. 223.

*Cheirogaleus*, Isid. G. St.-Hil. Cat. des Prim. p. 77.

*Lepilemur*, Gray, P. Z. S. (1863) p. 143.

*Myscebus*, Lesson, Species (1840), p. 214.

*Gliscebus*, Lesson, Species (1840), p. 216.

*Myocebus*, Schinz, Syst. Verz. i. p. 105 (1844).

*Otolicnus*, Van der Hoeven, Tijds. (1844) p. 43.

*Galago*, Gray, Ann. & Mag. Nat. Hist. (1842); Geoff. Ann. du Mus. xix. (1812) p. 166; Desm. Mamm. p. 103; Kuhl, Beitr. p. 47; A. Smith, S. Afr. Journ. (1835) ii. p. 31.

*Characters*.—Tarsus elongated, but astragalus normal; calcaneum about one-third the length of the tibia; upper incisors unequal, the anterior pair much the larger; third upper premolar very much smaller than the first molar, and with only one large external cusp; upper molars with an oblique ridge from the postero-external to the large internal cusp, the postero-internal cusp being rudimentary or absent. Palate more or less prolonged beyond last molars; posterior palatine foramina very large; præmaxillæ largely developed, joining the nasals for more than a quarter of their (the nasals') length; an interparietal bone; malar foramen minute or absent; angle of mandible not produced downwards; seven lumbar vertebræ.

#### 1. MICROCEBUS MYOXINUS.

*M. myoxinus*, Peters, Mittheilung zu der Gesells. Natur. Freunde, Berlin (1850); Reise nach Mossamb. p. 14; Wagner, Schreber, Supp. v. (1855) p. 154.

*Lepilemur myoxinus*, Gray, P. Z. S. (1863) p. 144.

The type of the species is in Berlin.

#### 2. MICROCEBUS MINOR.

*Galago minor*, Gray, Ann. & Mag. N. H. (1842) x. p. 257.

*Lepilemur murinus*, Gray, P. Z. S. 1863, p. 143 (skull).

*Otolienus minor*, Wagner, Schreb. Suppl. v. p. 159.

Type of the species in the British Museum.

### 3. MICROCEBUS SMITHII.

*Cheirogaleus smithii*, Gray, Ann. & Mag. N. H. 1842, x. p. 257 ; P. Z. S. 1863, p. 143.

*Chirogaleus smithii*, Wagner, Schreber, Suppl. v. p. 150.

*Microcebus pusillus*, Waterhouse, Cat. of Mus. of Z. S. 2nd ed. p. 12, no. 89.

Type of the species in the British Museum.

### 4. MICROCEBUS PUSILLUS.

*Le Rat de Madagascar*, Buffon, Suppl. iii. table 20, p. 149 (1776).

*Lemur pusillus* (*Le Maki nain*), Geoff. St.-Hil. Mag. Ency. (1796) i. p. 48 ; Bullet. Philom. 1<sup>re</sup> partie (1795) p. 89 ; Fischer, Anat. der Maki, p. 24.

*Lemur murinus*, De Blainv. Ostéogr. Lemur, pls. 10, 11, p. 12.

*L. ? murinus*, Fischer, Syn. p. 77.

*Microcebus rufus*, Geoff. St.-Hil. Cours de l'Hist. Nat. des Mamm. leçon vi. p. 26 (1828) ; Isid. G. St.-Hil. Cat. des Prim. p. 80 ; Schinz, p. 107 (1841).

*M. murinus*, Wagner, Schreber, Suppl. i. (1840) p. 278 ; v. (1855) p. 154.

*M. pusillus*, Peters, Reise nach Mossamb. p. 18.

*Myscebus palmarum*, Lesson, Species, p. 214.

*Gliscebus murinus*, Lesson, Species, p. 216.

*Galago madagascariensis*, Geoff. Ann. du Mus. xix. p. 166 ; Desm. Mamm. p. 103 ; Kuhl, Beitr. p. 47, t. 6. f. 1 ; A. Smith, S. African Journ. ii. (1835) p. 31 ; Gray, P. Z. S. 1863, p. 149.

*Otolienus madagascariensis*, Van der Hoeven, Tijds. (1844) p. 43.

Type of the species in the Paris Museum.

This species (according to De Blainville's figure) differs from all the other *Microcebi*, except *M. smithii*, in having the first upper premolar less vertically extended than is the second, and in the greater forward production of the præmaxillæ and nasals. According to M. Gervais's figure (Mammifères, p. 173), it also differs in the greater equality of the upper incisors.

### 5. MICROCEBUS TYPICUS.

*Cheirogaleus typicus*, A. Smith, S. Afr. Journ. ii. p. 50 ; Gray, Cat. Brit. Mus. 17 ; P. Z. S. 1863, p. 142.

*Chirogaleus typicus*, Wagner, Schreber, Suppl. v. p. 150.

Type of the species in the British Museum.

I have no knowledge of the cranial or tarsal structure of this species, or of the position of its gall-bladder. The first upper premolar is canine-like.

## 6. MICROCEBUS FURCIFER.

*Lemur furcifer*, De Blainv. Ostéogr. Lemur, pl. 7, & p. 35.

*Cheirogaleus furcifer*, Isid. G. St.-Hilaire, Cat. des Prim. p. 77 ;  
Compt. Rend. (1850) xxxi. p. 876.

*Chirogaleus furcifer*, Wagner, Schreber, Suppl. v. p. 149 ; Dahlb.  
Studia Zool. p. 223.

*Lepilemur furcifer*, Gray, P. Z. S. 1863, p. 145.

Type of the species in the Paris Museum.

This species is larger than the other *Microcebi*. Its skull differs from those of *M. myoxinus* and *M. minor* by not having the defects of ossification in the palate, and by the upper molars having a more marked external cingulum ; also the fifth cusp of the last inferior molar is quite rudimentary. It differs also from all the other *Microcebi* in the great length of the inferior incisors, and from all but *M. typicus* in the long and canine-like first upper premolar. This is longer, however, than even in *M. typicus*.

## Genus 4. CHEIROGALEUS, Geoff. St.-Hil. (1812).

*Cheirogaleus*, Geoff. St.-Hil. Ann. du Mus. d'Hist. Nat. t. 19.  
p. 171 (1812) ; Cours de l'Hist. Nat. leçon xi. (1828) ; Isid. G.  
St.-Hil. Cat. des Prim. p. 76.

*Chirogaleus*, Fischer, Syn. p. 69 ; Van der Hoeven, Tijds. p. 38 ;  
Wagner, Schreber, Suppl. i. p. 273, v. p. 147 ; Dahlb. Studia Zool.  
p. 221.

*Myspithicus*, F. Cuvier, Hist. Nat. des Mamm. 2nd ed. (1833)  
p. 228.

*Cebogale*, Lesson, Species (1840) p. 213.

*Mioxicebus*, Lesson, Species (1840) p. 218.

*Characters*.—Tarsus elongated by means of the production of the astragalus and calcaneum ; upper incisors unequal, the anterior pair the larger ; third upper premolar with only one large external cusp ; angle of mandible not produced downwards ; seven lumbar vertebræ.

## CHEIROGALEUS MILII.

*Cheirogaleus milii*, Geoff. St.-Hil. Cours sur les Mamm. 1828,  
p. 25 ; Isid. G. St.-Hil. Cat. des Prim. p. 77 ; Gray, P. Z. S. 1863,  
p. 142.

*Chirogaleus milii*, Wagner, Schreber, Suppl. i. p. 275, v. p. 149 ;  
Dahlb. Studia Zool. p. 223.

*Lemur (Chirogaleus) milii*, Van der Hoeven, Tijds. p. 38.

*Lemur milii*, De Blainv. Ostéogr. Lemur, table 7. pp. 12, 35.

*Le Maki nain*, F. Cuv. Hist. Nat. des Mamm. 1st ed. (1821).

Type of the species in the Paris Museum.

## Genus 5. LEPILEMUR, I. Geoff. St.-Hil. (1851).

*Lepilemur*, Isid. G. St.-Hil. Cat. des Prim. p. 75 ; Dahlb. Studia  
Zool. p. 220 ; Gray, P. Z. S. 1863, p. 144.

*Galeocebus*, Wagner, Schreber, Suppl. v. p. 147.